

ROLES OF SPEECH-LANGUAGE PATHOLOGISTS IN THE NEONATAL
INTENSIVE CARE UNIT

by
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DEDICATION

This thesis is dedicated to my parents who have always loved me unconditionally, supported me in whatever I chose to do, and encouraged me to be the best that I can be in every way.

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ABSTRACT

KATY LANE GREENLEE: Roles of Speech-Language Pathologists in the Neonatal
Intensive Care Unit

(Under the direction of Dr. Carolyn Higdon)

This thesis examined the roles of speech-language pathologists (SLPs) within the Neonatal Intensive Care Unit (NICU). In 2004, the American Speech-Language-Hearing Association published a set of policy documents regarding speech-language pathology practice in the NICU. Research compiled in the literature review explained and supported each of the roles listed in the ASHA policy documents. The literature also revealed that very few sources specific to the speech-language pathology field addressed roles other than those related to feeding and swallowing evaluation and intervention. This research investigated ASHA-certified, masters-level SLPs' familiarity with each of their possible roles in the NICU, as well as their opinions about these roles and their preparation for a NICU career upon completion of their graduate programs. An electronic survey was developed to investigate these three areas and was emailed to 518 SLPs from across the United States. One hundred forty (140) surveys were completed. The survey responses indicated that the SLPs were familiar with a majority of their possible roles in the NICU. However, a significant majority of the SLPs did not feel prepared for NICU practice following graduation from graduate school. Further research is needed to determine which topics of education would best help prepare students for careers in the NICU, as well as to support SLPs' involvement in a variety of roles within the NICU.

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CHAPTER I

INTRODUCTION

Speech-language pathologists (SLPs) originally became involved in the Neonatal Intensive Care Unit (NICU) in response to the need for more comprehensive treatment for preterm and low birth weight newborns. This need emerged because developments in modern medicine have led to the constantly increasing survival rate of preterm infants. According to ASHA's *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Technical Report* (2004c), about 12% of the infants born in the United States in 2002 were born prematurely, and 7.8% had a birth weight of 1,500 grams or less. In fact, the percentages of surviving preterm infants have steadily increased in the last thirty years. The surviving percentage of infants born at twenty-eight weeks or less increased from 26% in 1974 to 88% in 2003 (Robertson, Watt, & Dinu, 2009).

This increase in survival rates is due largely to improvements and innovations in NICU care. According to a study by Lorch, Baiocchi, Ahlberg, and Small (2012), preterm infants delivered at hospitals with high-level NICUs had a significantly lower rate of mortality and other complications than those delivered at hospitals without NICUs. This study shows that comprehensive NICU care is an important factor in these preterm and low birth weight infants' survival and future health. With these increasing survival rates, the need for a variety of services for these infants was identified, and SLPs began to enter

the NICU, in order to contribute to the all-inclusive environment of NICU care. At first, these SLPs acted primarily as feeding specialists. SLPs had been involved in the assessment and management of pediatric feeding and swallowing disorders since the 1930s (ASHA, 2004c), so it was only a matter of time before their roles and responsibilities expanded to include at-risk infants.

SLPs are particularly suited for therapeutic involvement in the NICU because of their expertise in treating swallowing disorders (ASHA, 2004b). Of all the medical and allied health care professionals, SLPs are best trained to understand the intricacies of infant oral anatomy and swallowing function (Fletcher & Ash, 2005). However, other NICU professionals did not immediately recognize the need for SLPs' involvement. Although there was a need for their services, many SLPs originally had a difficult time entering the NICU. Ziev (1999) reported experiencing many difficulties while attempting to create a new position for herself in the NICU. One main obstacle for many SLPs has been a lack of knowledge about embryology and neonatology (Ziev, 1999; Boswell 2007). According to Boswell (2007), SLPs providing services in the NICU must have specialized knowledge of infant development, the development of swallowing and communication, and medical conditions associated with low birth weight and prematurity. Ziev (1999) reported attending conferences and seminars and meeting with other NICU professionals in order to gain the expertise she needed to proceed with her career in the NICU.

As SLPs' involvement in the NICU setting expanded, the American Speech-Language Hearing Association (ASHA) recognized the need for a comprehensive set of documents defining the roles and responsibilities, evidence-based practice, and the needs

in research and education for SLPs working in the NICU (ASHA, 2004c). As a result, the Ad Hoc Committee on Speech-Language Pathology Practice in the Neonatal Intensive Care Unit was formed, and this committee drafted a set of documents on the roles of SLPs in the NICU. These documents were approved by ASHA's Legislative Council in 2004 (ASHA, 2004c).

The roles and responsibilities for SLPs working in the NICU defined by the ASHA policy documents are quite broad; however, it is unclear whether the majority of SLPs are aware of all of the various roles that they can fill in the NICU. According to the *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b), SLPs' roles in the NICU fall into four main categories: (a) communication evaluation and intervention, (b) feeding and swallowing evaluation and intervention, (c) parent/caregiver education and counseling, staff (team) education and collaboration, and (d) other roles. However, despite ASHA's position statement, most of the SLP-specific sources that the author identified for the literature review focused only on feeding and swallowing (Arvedson, Clark, Lazarus, Schooling, & Frymark, 2010). Other than the ASHA policy documents, there seem to be very few resources produced specifically for SLPs concerning the other areas of NICU practice.

Feeding assessment and intervention is the role that first comes to mind when considering SLPs' roles and responsibilities in the NICU, because it is the role that originally brought SLPs into the NICU. Though NICU nurses can competently feed most babies, SLPs have much-needed expertise in interpreting infants' feeding cues (ASHA, 2004c). If preterm infants are encouraged to bottle feed before they are physiologically or behaviorally ready, they may experience increased stress and fail to make necessary

progress (McGrath & Bodea Braescu, 2004). Studies have shown increased success when infants are fed according to their individual cues instead of on a predetermined schedule. McCain (2003) found that infants who were fed according to their cues benefited by reaching full oral feeding and readiness for hospital discharge an average of five days sooner than those fed in the traditional, scheduled manner. SLPs can help to interpret infants' cues, which are some of the earliest forms of communication.

Communication and developmental assessment and intervention is an example of an area included in SLPs' roles and responsibilities that receives inadequate attention in SLP-specific literature. According to Nagy (2008), infants participate in social communication interactions as early as birth; consequently, newborns can be assessed for signs of communication delays. Early identification of communication and cognition problems is essential in preventing poor academic, social, and vocational progress later in life (Scheffler et al., 2007). Infants that require NICU care are often at a greater risk of developing language and cognitive delays (Scheffler et al., 2007). A study by Buhler, Limongi, and Albuquerque Diniz (2009) found that very low birth weight and preterm infants had delayed cognitive and expressive language development when compared with term infants. Buhler et al. (2009) concluded that there is a need for identification of communication problems in very low birth weight, preterm infants, so that early speech and language intervention can help limit the effect of these communication delays. As the communication experts in the NICU, SLPs are best suited to conduct these important communication assessments and formulate intervention plans to promote the best outcomes for each infant.

Speech-language pathologists may also be involved in neurobehavioral assessments of infants in the NICU. Because neurobehavioral organization affects the whole infant, including the development of communication, one of the SLPs' roles can be assessing and promoting behavioral organization. Preterm infants are more likely to have poor organizational skills because of their immature brain development (Mouradian, Als, and Coster, 2000). A study by Als and Brazelton (1981) found that preterm infants exhibited consistently poorer and more restricted organization than term infants. The preterm infants were more easily exhausted, more physiologically fragile, and had poor alertness. SLPs can help to promote infants' neurobehavioral outcomes through parent education (Cerezo, Pons-Salvador, and Trenado, 2008; Xu & Filler, 2005), therapeutic positioning (Hunter, 2004), and the promotion of kangaroo care (Ludington-Hoe, Thompson, Swinth, Hadeed, & Anderson, 1994; Victor & Persoon, 2004).

In addition to providing services related to communication and feeding, SLPs can also provide essential parent education and counseling. Family-oriented care is a key component of NICU practice (Shaller, 2007), so family education is an important part of SLPs' responsibilities. SLPs can help facilitate mother-infant communication interactions in order to promote positive developmental outcomes (Cerezo, Pons-Salvador, and Trenado, 2008; Xu & Filler, 2005). Educating parents about feeding techniques that can be used at home is also important (Swigert, 2010). In addition, SLPs can coordinate with lactation consultants to counsel mothers about breastfeeding (Fletcher & Ash, 2005). Swift and Scholten (2010) reported that many parents felt that they were not included in decisions about their baby's care and that the NICU lacked privacy. The researchers suggested making the NICU more family-friendly by providing private rooms for

expressing breast milk, facilitating mother-infant interactions, and focusing efforts on staff-parent collaboration and counseling (Swift & Scholten, 2010). By supporting this type of parent-friendly environment, SLPs can play an integral role in bridging the gap between parents and NICU staff.

SLPs can also participate in various other roles in the NICU, including quality control and risk management (Ballweg, 2001; Mahlmeister, 2009), discharge planning (Mills, Sims, & Jacob, 2006; American Academy of Pediatrics, 1998), follow-up care (Als, Duffy, & McAnulty, 1988; Tien, Peterson, & Shelley, 2002), professional supervision (ASHA, 2008), public education and advocacy (Billeaud, 2003), and research (Wambaugh & Bain, 2002). In the NICU environment, a collaborative approach is necessary, and all professionals must work together to provide the best care for the infants (Boswell, 2002). The National Association of Neonatal Therapists (Sturdivant & Ludwig, 2011) is a group formed by professionals who believe that NICU care should be transdisciplinary and should focus on the infant rather than the specific responsibilities of professionals from different disciplines. Sturdivant and Ludwig (2011) included speech-language pathologists in their list of those who can qualify as transdisciplinary neonatal therapists, and this inclusion emphasizes the potential for the expansion of SLPs' roles in the NICU.

Because of the extremely broad and varied roles and responsibilities of SLPs within the NICU, the author felt that there could be some confusion among SLPs across the country about which roles are and are not appropriate for SLPs' involvement in the NICU. The following study addressed speech-language pathologists' perceptions of their responsibilities within the Neonatal Intensive Care Unit. The purpose of this study was to

determine whether SLPs across the country were knowledgeable about their roles in the NICU as outlined in the ASHA position statement (2004b), as well as to determine whether SLPs felt that they were prepared to provide services in a NICU setting upon graduation from their masters degree programs. In order to measure the SLPs' knowledge and opinions, the author formulated a short survey based on a review of the literature and sent the survey electronically to SLPs from across the United States.

Speech-language pathologists' roles within the NICU include a wide variety of responsibilities. SLPs working in the NICU setting conduct communication and developmental assessments and interventions and feeding and swallowing assessments and interventions, and they play a vital role in parent education and counseling. Because of the diversity of these roles, SLPs across the country may or may not be familiar with their roles in the NICU, and may have differences of opinion on what exactly SLPs' roles should include. In addition, since knowledge of complex subjects such as embryology and infant pre- and post-natal development is necessary for practice in the NICU, SLPs may feel that their graduate programs did not prepare them for a career in such a specialized setting. This study investigated speech-language pathologists' knowledge of their roles in the NICU as defined in the ASHA position statement (2004b) and their opinions about these roles, as well as their preparedness for work in the NICU upon completion of their graduate programs.

CHAPTER II

LITERATURE REVIEW

Speech-language pathologists (SLPs) fill many different roles and responsibilities within the Neonatal Intensive Care Unit (NICU). Preterm infants' survival rates have dramatically increased in the last thirty years, from 26% in 1974 to 88% in 2003. In addition, the percentage of surviving preterm infants with no long-term impairments has increased from 22% to 77% (Robertson, Watt, & Dinu, 2009). This increase in survival rate, as well as the minimizing of impairments, is largely due to advances in NICU care. Lorch, Baiocchi, Ahlberg, and Small (2012) found that preterm infants who were delivered at a high-level NICU had significantly greater survival rates than those who did not receive NICU care. SLPs play an important part in the life-saving care that takes place in the NICU, as well as the efforts to minimize the long-term negative effects of premature birth.

ASHA's *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b) lists all of the SLPs' possible roles within the NICU. Some of these roles are commonly attributed to SLPs, while other roles may be less familiar. SLPs working in other settings may or may not know what their colleagues in the NICU actually do. Even SLPs working in NICUs may not realize the broadness of their possible roles and responsibilities. In order to better understand each role in the NICU, as well as the literature that supports each role, the author reviewed literature supporting each of the roles listed in the ASHA position statement (2004b). The position

statement (2004b) divides the roles into four main categories, and the literature that was reviewed also falls into these four categories, which are communication evaluation and intervention; feeding and swallowing evaluation and intervention; parent/caregiver education and counseling and staff education and collaboration; and miscellaneous other roles that SLPs may assume in the NICU.

Communication Evaluation and Intervention

Although infants in the NICU are months away from their first words, communication evaluation and intervention is still an essential part of their care. Infants communicate their wants and needs through body signals and cues; in the NICU where infants' vital signs are being constantly monitored, an increase in heart rate or a decrease in oxygen saturation can signal that the infant is in distress. Problems with these early forms of communication can foreshadow more serious developmental problems, brought on by prematurity or other complications. For this reason, SLPs' role in communication and developmental assessment and intervention is extremely important. Early identification of developmental problems is key to successful intervention, and SLPs play an important part in this identification and intervention process.

Communication and developmental assessment.

The following literature shows the need for communication, developmental, and neurobehavioral assessments of infants in the NICU. Nagy (2008), Buhler, Limongi, and Albuquerque Diniz (2009), and Scheffler et al. (2007) all emphasized the need to screen preterm and very low birth weight infants for communication problems. Preterm infants are those born at less than thirty-four weeks gestation, and very low birth weight refers to a birth weight of 1,500 grams or less (Buhler, Limongi, and Albuquerque Diniz, 2009). A

study by Nagy (2008) showed that newborn infants participate in communication interactions as early as birth and, consequently, can be assessed for communication delays.

Because preterm and low birth weight infants are more likely to exhibit communication delays and disorders, early assessment of NICU infants is particularly important. Buhler et al. (2009) compared preterm, very low birth weight infants' expressive language development to that of term infants. In newborns, expressive language consists of gestures and vocalizations related to needs, such as crying when hungry. The researchers found that the preterm, very low birth weight infants' expressive language was delayed when compared to the term infants' expressive language. These results demonstrate the need for communication assessment of preterm, very low birth weight infants, in order to identify and begin treating any language delays.

Timely assessment and treatment of language delays is essential in order to prevent adverse effects for the child later in life. According to Scheffler et al. (2007), many communication and developmental delays can be diagnosed before the age of twenty-four months, and failure to diagnose these language delays can put children at risk for poor academic and social progress during their school years. However, with early diagnosis and treatment, infants can begin to develop skills that might have been delayed without proper intervention.

The need for communication assessment of infants is clear; however, the means of assessment varies considerably. Billeaud (2003) discussed the pros and cons of different types of communication assessment for infants. Standardized tests can usually be conducted quickly and produce results based on normative data. In addition, some

states require standardized testing in order to qualify children for intervention services. However, if the normative data was collected using a group with different medical conditions than those from which a particular infant suffers, the results may be affected. Also, very young infants may not be able to comply with the protocols required for some standardized tests. Billeaud (2003) also discussed judgment-based assessments. Judgment-based assessment is flexible and can be tailored to the individual infant's needs. However, this type of assessment requires subjective judgments, and results may vary depending on who conducts the assessment. Billeaud (2003) recommended using a combination of standardized tests and judgment-based assessment in order to create a complete picture of each infant's needs.

When assessing infants for communication delays and disorders, other medical and developmental conditions must be taken into account. Billeaud (2003) discussed a variety of conditions that either include a communication component or often accompany a communication disorder. For example, disorders such as Down syndrome and cerebral palsy include a communication component along with many other symptoms. All infants with congenital disorders must be medically stable before communication assessment can begin. Conversely, conditions that either accompany or stem from a primary communication disorder often do not emerge until early childhood. If the communication difficulty is diagnosed in infancy, parents and medical professionals are able to watch for signs of related conditions such as autism, specific learning disabilities, and attention deficit disorder.

Not only preterm infants' communication and language, but also their neurobehavioral development should be assessed in the NICU. Infants' neurobehavior is

assessed mainly on the basis of their ability to self-regulate and focus their attention. Infants' self-regulating behavior includes the ability to limit their own reactions to environmental factors such as light, sound, and touch. Infants with better neurobehavioral organization are less reactive, less stressed, and less excitable in the presence of these environmental factors (Lester et al., 2011). Als and Brazelton (1981) and Mouradian, Als, and Coster (2000) found evidence supporting the need to assess preterm and very low birth weight infants' neurobehavioral development. In 1981, Als and Brazelton conducted two case studies assessing the neurobehavior of one preterm and one full-term infant using the Assessment of Preterm Infants' Behavior (APIB) (Brazelton, 1973). The APIB is a commonly-used assessment of behavioral organization. The preterm infant scored lower on the APIB than the full-term infant and also exhibited consistently poorer self-regulation and focus.

In 2000, Mouradian, Als, and Coster compared the neurobehavior of three groups of infants, using a more recent version of the APIB (Als, Lester, Tronick, & Brazelton, 1982). The three groups assessed were infants born at thirty-four weeks gestation, thirty-seven weeks gestation, and forty weeks gestation. The researchers found that as gestational age decreased, neurobehavioral organization also decreased, demonstrating that gestational age at birth significantly influences the neurobehavior of infants. Mouradian et al. (2000) also explained that because preterm infants are more easily overstimulated than full-term infants, parents of preterm infants should be counseled on ways to prevent overstimulation and promote neurobehavioral development.

Assessing neurobehavioral development is also important in the NICU because it can provide valuable insight into ways that the NICU environment can be adjusted to

nurture organized neurobehavior. Lester et al. (2010) studied the effects of a single-room NICU environment on infants' neurobehavior. The researchers reported that the infants in the single-room environment showed less stress, less excitability, and better self-regulation and attention than infants in a traditional open-bay NICU environment. The researchers hypothesized that these positive neurobehavioral outcomes were due to the enhanced interaction between mothers and their infants, but cautioned that more research is needed to support this hypothesis.

Communication intervention and promotion of developmental outcomes.

After an infant in the Neonatal Intensive Care Unit has been diagnosed with a communication, developmental, or neurobehavioral delay, the next step is to begin intervention. Because infants primarily communicate with their mothers or other caregivers, facilitating mother-infant interactions is key in promoting the infant's proper development (Cerezo, Pons-Salvador, & Trenado, 2008). Xu and Filler (2005) and Cerezo, Pons-Salvador, and Trenado (2008) agreed that facilitating mother-infant interactions is the best intervention strategy for infants in the NICU with communication or developmental problems.

According to Xu and Filler (2005), parent involvement is the most important component of any NICU intervention. Promoting an interactive relationship between infants and their parents is essential to the infants' communication development. The researchers stated that parents should be counseled on ways to effectively interact with their babies. Cerezo, Pons-Salvador, and Trenado (2008) also emphasized the need to facilitate parent-infant interactions. The researchers studied the relationship between the quality of mother-child interaction and the child's communication and language

development, and found that high-quality mother-child interaction did positively affect children's communication development. These two studies support the need for interventions that counsel and support parents on ways to effectively interact with their infants.

Two other sets of researchers, Ludington-Hoe, Thompson, Swinth, Hadeed, and Anderson (1994) and Victor and Persoon (1994), advocated for the use of a specific strategy called kangaroo care to facilitate mother-infant communication. Kangaroo care is a process in which the infant is placed in an upright position between his mother's breasts, providing skin-to-skin contact. Ludington-Hoe et al. (1994) reported that infants who received kangaroo care experienced deeper sleep and longer sleep durations, without any adverse effects. In addition, according to Victor and Persoon (1994), kangaroo care can have positive medical effects on infants and ultimately result in shorter NICU stays. Kangaroo care also has positive effects on mothers, helping them feel more attached to their babies. Both sets of researchers recommended kangaroo care for medically stable infants in NICU nurseries, in order to promote positive medical outcomes for the infant, as well as to increase interaction between mothers and their babies.

Neurobehavioral and motor developmental outcomes must also be considered when planning interventions for infants in the NICU. Hunter (2004) explained the importance of correctly positioning preterm and low birth weight infants and the effects that correct positioning can have on neurobehavioral development. Infants who have extended stays in the NICU can develop physiologic problems such as abnormal head shape or abnormal limb positioning, which can cause delays in motor skills in early childhood. To prevent these abnormalities, Hunter (2004) recommended repositioning

infants at least once every two to four hours. The author also explained the relationship between positioning and neurobehavioral development. In the womb, the infant is surrounded on all sides by boundaries that prevent the complete extension of the limbs. Likewise, preterm infants in the NICU should be swaddled to prevent limb overextension, because preterm infants' immature nervous systems can be overstressed by overextension of their limbs. Hunter (2004) recommended that NICU professionals attempt to make the infant's immediate environment as much like the womb as possible, so that the infant's development can progress in the same ways that it would have inside the womb. This womb re-creation technique is called therapeutic positioning and is being successfully used in many NICUs throughout the United States.

Feeding and Swallowing Evaluation and Intervention

The second important area of speech-language pathologists' services in the NICU is in feeding and swallowing evaluation and intervention. Many preterm and very low birth weight infants are born with physiology and reflexes that are too immature for successful breastfeeding or bottle feeding. A study by Medoff-Cooper (2005) found that full-term infants had significantly more mature sucking behaviors than preterm infants, including longer sucks and more sucks between rests. Likewise, in 2010, Bingham, Ashikaga, and Abbasi found that gestational age at birth and birth weight were both consistent predictors of infants' feeding success. Specifically, feeding ability decreased with both gestational age and birth weight. These studies demonstrate the importance of feeding and swallowing evaluations and interventions in the NICU, and support the need for speech-language pathology services in this area.

Clinical and instrumental assessments of feeding and swallowing.

Because infants in the NICU are at such a high risk for feeding problems, assessment of their feeding skills and feeding readiness are essential. McGrath and Bodea Braescu (2004) reported that if preterm infants are encouraged to bottle feed or breastfeed before they are developmentally ready, they may become over-stressed and their success can be compromised. The authors cautioned that all available information should be used when deciding whether or not an infant is ready to begin oral feeding. Infants' feeding skills are most commonly assessed through a clinical, or observational, assessment. Some of the factors suggested for evaluation include behavioral organization, hunger cues, and sucking, swallowing, and breathing coordination. Many preterm newborns lack the organization necessary to successfully coordinate sucking, swallowing, and breathing, which can put them at risk for aspiration and make oral feeding extremely dangerous. For this reason, assessing feeding readiness is an essential part of an infant's evaluation.

Thoyre, Shaker, and Pridham (2005), Billeaud (2003), and Swigert (2010) each provided outlines for conducting clinical assessments of infants' feeding and swallowing. The researchers all suggested a continuous assessment model that includes assessments before, during, and after the feeding. Thoyre et al. (2005) focused mainly on using physiologic stability levels to determine the infant's feeding success. In this model, heart rate and oxygen saturation are assessed at each stage, as well as alertness and energy level.

In Billeaud's (2003) recommended assessment, oral reflexes are assessed before feeding is attempted. Oral reflexes include the rooting reflex, in which the infant turns his head toward an object or finger tapped on either cheek, and the sucking reflex, in which

the infant initiates sucking on a pacifier or finger inserted in his mouth. Billeaud (2003) also recommended experimenting with different techniques to help the infant feed more successfully and observing their effects on the infant's performance. Some possible aiding techniques include placing the infant on his side, holding the infant's jaw for support, or pressing on the infant's tongue to initiate swallowing. Billeaud (2003) emphasized that aiding techniques should be introduced at SLPs' discretion and should be tailored to each infant's individual needs.

The assessment proposed by Swigert (2010) includes a comprehensive examination of all anatomical structures involved in feeding. This assessment focuses on observing the infant's behaviors, beginning with muscle tone and alertness and moving to reflexes and non-nutritive suck. Non-nutritive suck refers to sucking on a pacifier. Swigert (2010) also recommended looking for signs of disorganization and stress during the feeding and using these factors to determine feeding success, rather than determining success based on the amount of intake alone. Like Billead (2003), Swigert (2010) suggested ending the evaluation by experimenting with techniques to help the infant feed more successfully and recording the effects.

Although clinical assessments are most commonly used when evaluating infants in the NICU, speech-language pathologists do conduct instrumental assessments when needed to obtain more detailed information about an infant's swallowing. A typical swallow occurs in four phases. The oral preparatory phase and the oral transport phase are voluntary and involve chewing and moving the food or liquid toward the back of the mouth. Then, during the pharyngeal phase, the involuntary swallow reflex moves the food down into the throat. Finally, during the esophageal phase, the food is transported

down the esophagus by involuntary muscle contractions. Swigert (2010) explained that instrumental swallowing assessments are important in assessing the pharyngeal and esophageal phases of swallowing, since these two phases cannot be observed with the naked eye.

Swigert (2010) also discussed the two types of instrumental swallowing assessments routinely conducted by speech-language pathologists. In a modified barium swallow (MBS), the infant is presented with food or liquid mixed with barium, and an x-ray machine captures each phase of the swallow. The MBS is most commonly selected for use with infants because of its non-invasive nature and its ability to capture multiple phases of the swallow. The other type of instrumental assessment, the fiber optic endoscopic evaluation of swallowing (FEES), requires the use of an endoscope. The scope is inserted through the infant's nose and down his throat, and is used to capture the pharyngeal and esophageal phases of the swallow. The FEES is usually chosen when the infant is completely non-oral, meaning that he is being fed exclusively through a feeding tube, or when the infant has structural abnormalities of the pharynx or larynx that need to be observed. An additional benefit of the FEES is that it does not require exposing the child to any radiation, which may be a factor that concerns parents. Overall, instrumental swallowing assessments are useful when SLPs suspect some difficulty in the pharyngeal or esophageal phase of an infant's swallow.

Abnormal anatomy and additional disorders that impact swallowing.

Infants in the Neonatal Intensive Care Unit often exhibit one or more primary conditions that negatively impact their feeding and swallowing abilities. Infants may have some type of abnormal anatomy that inhibits feeding, either resulting from a congenital

condition (Swigert, 2010) or simply due to premature birth (Burklow, McGrath, & Kaul, 2002; Newman, Keckley, Petersen, & Hamner, 2001). In addition, a majority of NICU infants have complicating medical conditions that also affect their feeding and swallowing success (Ludwig, 2007). Speech-language pathologists working with infants in the NICU must be aware of the abnormal anatomy and additional disorders that impact infants' feeding, in order to develop appropriate intervention plans for these infants.

According to Swigert (2010), some infants have structurally-based feeding disorders, a term referring to some type of abnormal anatomy. This abnormal anatomy can include everything from structural problems of the face and mouth, such as cleft lip and palate, to physiologic problems associated with an abnormally developed gastrointestinal tract. Swigert (2010) cautioned that infants with some structurally-based problems may require surgery before oral feeding can be initiated. Others, such as those with cleft palate, can be bottle fed using special nipples even before surgery.

In addition to structural problems, preterm infants often have abnormal anatomy simply because of their developmental immaturity at birth. Burklow, McGrath, and Kaul (2002) reported that preterm infants are born without the fatty buccal pads on their cheeks that aid full-term infants in their sucking ability. This lack of buccal pads creates extra space in the mouth that makes sucking and lip closure difficult. The researchers also noted that preterm infants commonly have gastrointestinal reflux and respiratory problems, as well as other medical conditions that inhibit feeding. According to the researchers, up to 50% of preterm infants born at 1,500 grams or less experience intraventricular hemorrhage, or bleeding in the brain. This bleeding can sometimes

impair the infant's motor functioning and reflexes, leading to feeding and swallowing problems.

Ludwig (2007) also discussed some medical conditions that can impact infants' feeding success. Hypoglycemia, jaundice, and temperature instability are all common in preterm infants and can cause decreased arousal and awareness. When an infant is not sufficiently aroused, he will be easily fatigued and may not have enough endurance to complete a feeding session successfully. In addition, Ludwig (2007) reported that preterm infants often exhibit poor muscle tone and motor control, which also contribute to feeding problems.

In 2001, Newman, Keckley, Petersen, and Hamner conducted a study which partially contradicts the previous research discussed in this section. Newman et al. (2001) studied the relationship between certain medical diagnoses and swallowing problems in infants. The medical diagnoses included in the study were neurologic disorders, prematurity, respiratory problems, and apnea. The researchers found that infants born prematurely were more likely to exhibit swallowing problems. However, no significant relationships were found between the other three types of medical conditions and swallowing disorders. Despite the disagreement between these researchers' findings and those in the other articles discussed, this study does confirm that preterm infants are extremely likely to exhibit feeding and swallowing problems, with or without the complication of abnormal anatomy or additional disorders.

Feeding and swallowing intervention.

In most Neonatal Intensive Care Units, one of the main criteria for discharge is that the infant successfully complete full oral feedings, since feeding provides the

nutrition needed to sustain life and health (McGrath, 2004). As a result, providing feeding and swallowing intervention is an extremely important part of the SLPs' responsibilities. The literature in this section provides information about interventions that can be used to facilitate proper feeding and swallowing in infants in the NICU.

When an infant has feeding or swallowing problems, he receives nutrition through gavage (tube) feeding. Most commonly, the infant is originally given a small amount of formula or breast milk through a nasogastric tube, and the amount is increased in intervals until the infant is receiving the recommended amount of nutrition daily. However, a study by Krishnamurthy, Gupta, Debnath, and Gomber (2010) supported rapid gavage feeding advancement, a technique contrary to common practice. The researchers found that infants whose daily feeding amounts were advanced more rapidly needed fewer days of intravenous fluids and had shorter hospital stays overall. In addition, the researchers did not find any adverse effects associated with the rapid gavage feeding advancement. This study supports increasing the amount of formula or breast milk delivered by feeding tube as quickly as possible until the full amount needed for the infant's nutrition is reached.

While infants are receiving gavage feedings to maintain their health, SLPs can attempt to prepare the infants for oral feeding through a variety of intervention techniques. Arvedson, Clark, Lazarus, Schooling, and Frymark (2010) conducted a systematic review of the literature on the effects of oral motor interventions on feeding and swallowing outcomes in preterm infants. The type of oral motor intervention that the researchers focused on was non-nutritive suck (NNS). NNS involves allowing the infant to suck on a pacifier for the purpose of coordinating sucking for safe oral feeding. The

researchers found that NNS had a positive effect on infants' feeding progress. Infants who had practiced sucking using NNS exhibited better sucking pressure and achieved total oral feeding sooner than infants who had not used NNS.

McGrath (2004) and McCain (2003) also supported the use of NNS as an intervention technique for preterm infants. Likewise, both researchers recommended using a variety of techniques depending on the needs of the individual infant. McGrath (2004) reported that decisions of when and how to introduce oral feedings should not be guided by established nursery routines or convenience, but rather by each infant's individual cues and demands.

McCain (2003) agreed that feedings should be guided by infants themselves and created her own infant-centered semi-demand method for helping infants transition from gavage to oral feeding. Infants are able to indicate hunger at 32 to 35 weeks gestational age, using behaviors such as restlessness or alertness. According to McCain's method, caregivers should feed infants in the NICU when they exhibit these hunger cues, rather than on a fixed schedule. Then, the caregiver should record the infant's level of success with the feeding, and that information should be used to guide the next feeding. McCain (2003) found that infants fed using her semi-demand method reached full oral feeding and readiness for hospital discharge an average of five days sooner than those fed on a fixed schedule.

In addition to the feeding schedule, other elements of the intervention should also be tailored to fit each individual infant's needs. Swigert (2010) discussed techniques that can be used to aid the baby at each stage of feeding, depending on his needs. Changes to the sensory environment, such as adjusting lighting, can be used to increase the infant's

alertness for feeding. Once the infant has begun to eat orally, positioning and oral stimulation including stroking or tapping the tongue can help increase the sucking strength. Swigert (2010) also emphasized the importance of selecting the correct nipple type for each infant, depending on the infant's specific needs.

As well as bottle-feeding interventions, speech-language pathologists can provide assistance with breastfeeding for infants and mothers. Breastfeeding is strongly encouraged in the NICU, due to its significant benefits for the baby. According to Stevens, Patrick, and Pickler (2009), many modern mothers feel that breastfeeding is inconvenient and unnecessary. The authors reported that the mass-marketing of formula has contributed to the decline of breastfeeding, because it has led mothers to believe that formula is just as beneficial to their baby as breast milk. However, breastfeeding is, in fact, better for infants' nutrition than formula feeding. Stevens et al. (2009) even attributed conditions such as obesity and diabetes to formula feeding. In light of this information, mothers of infants in the NICU should be encouraged to breastfeed, since these infants are extremely fragile and need the best nutrition possible.

SLPs can independently support mothers in breastfeeding, or they can collaborate with an International Board Certified Lactation Consultant (IBCLC). According to Fletcher and Ash (2005), most hospitals with newborn nurseries employ IBCLCs to help mothers who are having difficulties breastfeeding. However, when the infant's feeding problems include medical complications, as is the case for many infants in the NICU, IBCLCs may collaborate with SLPs for assessment of the breastfeeding problem. SLPs can observe a breastfeeding attempt and then suggest techniques to improve success,

usually involving positioning changes or stimulation techniques similar to those used in bottle feeding.

Parent/Caregiver Education and Counseling, Staff (team) Education and Collaboration

As well as conducting communication and feeding assessments and developing and implementing intervention plans, speech-language pathologists in the NICU also provide parent and staff education. Parent education is an extremely important part of NICU services, because parents are an integral part of newborns' lives. Parents should be educated about SLPs' roles in their baby's care, as well as updated on their baby's progress. In the area of staff education, SLPs can contribute by teaching other health care professionals developmental or feeding techniques, especially the nurses who spend the most time with the babies and are responsible for the majority of their care. In addition, SLPs contribute to the overall NICU environment by collaborating with the other members of the NICU team. SLPs' roles in the NICU can help to ensure that each infant receives the best possible care.

Developmental care.

One important way that SLPs can contribute to the overall environment of the NICU is through participation in a developmental care plan. According to Aita and Snider (2003) and Als (1998), developmental care is a system of NICU operation which relies on interaction between the infants and caregivers. In a developmental care setting, each infant's care is individualized for his or her specific needs. Infants are cared for based on their cues rather than a systematic schedule. Developmental care requires continuous assessment and continuous updating of each infant's care plan, based on their

progress and cues. Finally, collaboration is an essential component of developmental care. In order for a developmental care plan to be successful, every member of the NICU personnel must be in agreement about what type of care should be provided to each infant and when.

Aita and Snider (2003) and Als (1998) also reported positive outcomes stemming from developmental care. Infants' rates of growth and development were positively affected by developmental care (Aita & Snider, 2003). In addition, infants in a developmental care setting required less ventilator support, had faster transitions to oral feeding, and were discharged an average of two months earlier than infants who did not receive developmental care. Also, children who had received developmental care as infants displayed positive effects later in childhood. These children exhibited language skills comparable to their peers who had not required NICU care as infants (Als, 1998).

Ludwig and Waitzman (2007) focused on feeding intervention within a developmental care setting, and explained how it differs from a traditional model of feeding intervention. In traditional practice, infants are fed on a fixed schedule, regardless of their cues. Documentation for the traditional model is based primarily on volume of intake, and changes in infants' behaviors during the feeding are not usually documented. However, in a developmental care setting, an infant-driven model of feeding intervention is used. In infant-driven practice, infants are fed based on their cues, which were discussed earlier in this literature review. In addition, documentation for an infant-driven feeding model focuses on recording the infant's cues and behaviors, as well as any assistive techniques the caregiver uses.

Facilitation of a supportive and nurturing NICU environment.

Developmental care is one essential component of a nurturing NICU environment that SLPs can help to support. SLPs can also participate in other collaborative programs to ensure that the NICU is a fully infant- and family-centered environment. White (2011) explained how the sensory environment of the NICU can impact the comfort of both infants and their families. Infants' development can be enhanced through environmental changes such as circadian lighting and low-noise, single-family rooms. Circadian lighting refers to brightening lights in the NICU during the day and dimming them at night, which promotes the proper development of infants' biological clocks. Also, many NICUs have begun transitioning to single-family rooms, which are significantly less noisy than the traditional open-bay environment in which all of the infants were housed in one or two large rooms. The single-family room design also positively affects infants' families and caregivers, due to decreased crowding and noise.

Adjustments to the sensory environment are one of many ways to make the NICU more infant- and family-centered. Shaller (2007) emphasized the importance of patient-centered care in any medical setting, especially those caring for infants or children. Patient-centered care has been shown to improve patient and family satisfaction, as well as medical outcomes. According to Shaller (2007), the most essential factor in establishing a patient-centered environment is collaboration. All medical professionals must work together and with the patients and their families in order to provide the best care possible. In the case of infants, parents and caregivers should be viewed as an essential part of the medical team and should be involved in every step of decision-making regarding their child.

The elements of developmental care, sensory environment changes, and patient- and family-centered care all come together in one comprehensive program called the Newborn Individualized Developmental Care and Assessment Plan (NIDCAP), developed by Als et al. (1986). Professionals working in NICUs can complete coursework and attend seminars to become certified NIDCAP providers. The NIDCAP emphasizes interaction-based, individualized care, and promotes a nurturing environment for both infants and their parents. According to Westrup (2007), when the NIDCAP program is used consistently in a NICU, both medical professionals and parents learn to better recognize and respond to infants' cues. Documentation for the NIDCAP focuses on recording infants' behaviors and responses to feeding and other care-giving procedures. When implemented correctly, the NIDCAP has been shown to improve developmental outcomes for preterm infants.

Culturally-appropriate care.

Another element of a family-centered NICU environment is culturally-appropriate care. According to Horton-Ikard, Munoz, Thomas-Tate, and Keller-Bell (2009), SLPs should be familiar with the history and culture of minority groups in the United States, and should practice cultural sensitivity at all times. SLPs will likely provide services to infants from culturally and linguistically diverse backgrounds and should be prepared to handle these patients sensitively. Working with the family is extremely important when diversity is involved, in order to ensure that SLPs' goals are considered appropriate for the family's culture.

Moore (1999) discussed handling culturally and linguistically diverse clients, especially when cultural beliefs contradict typical medical practice. When necessary, a

professional translator should be used rather than a family member, due to privacy concerns. However, if a woman wants to defer to her husband or father on decisions involving her baby due to cultural tradition, medical professionals should respect her wishes. In situations where cultural beliefs are in conflict with accepted medical practice, the family should be given all relevant information before they make a final decision. Overall, culturally-appropriate care is an important part of any medical setting, including the NICU. SLPs and other health care professionals should be educated about U.S. minority groups and should respect the beliefs of all cultures, even when they differ from traditional medical beliefs.

Parent education and counseling.

Culturally sensitive parent education and counseling is one of the most important but often overlooked roles of SLPs in the NICU. Communication with parents is key to NICU success, and parents should be informed about every detail of their baby's care. A study by Swift and Scholten (2010) investigated the feelings and concerns of parents whose babies were receiving NICU care. Many of the parents reported feeling uncomfortable in the NICU environment and detached from their babies' care. Some reported extreme stress, and others felt powerless to help their babies improve. This study shows the need for more effective communication between NICU professionals and parents. Parents should be viewed as active collaborators in their babies' care, rather than outsiders who can do nothing to help.

Mothers also reported reluctance to breastfeed in the NICU, due to lack of support and privacy and insufficient milk supply (Swift & Scholten, 2010). Because mothers are often separated from their newborns when they are taken to the NICU, insufficient milk

supply is a common problem. In addition, infants in the NICU often exhibit developmentally immature sucking and swallowing, which contributes to breastfeeding difficulties (Castrucci, Hoover, Lim, & Maus, 2007). Breastfeeding counselors, such as International Board Certified Lactation Consultants (IBCLCs) as well as SLPs can help alleviate these problems with breastfeeding. Castrucci, Hoover, Lim, and Maus (2007) studied the relationship between the presence of an IBCLC in the NICU and percentage of mothers who chose to breastfeed, and found that the rates of breastfeeding were 34% higher among women at hospitals with an IBCLC. This study shows that proper parent counseling and communication can improve breastfeeding outcomes, as well as the overall NICU experience.

Many health care professionals understand the importance of parent communication, but still have difficulty effectively communicating with parents in the NICU. Fowlie and Jackson (2007) discussed the pros and cons of various parent communication strategies. Parents who received audio tapes of their meetings with doctors and other medical professionals in the NICU recalled more information about their child's diagnosis, intervention plan, and progress than those who did not receive audio tapes. However, recording parent consultations raises privacy concerns. Written communication, such as informative pamphlets on specific topics, can also be quite effective. For example, during an initial meeting, an SLP might give the parents of a new patient a document clearly explaining SLPs' roles. The parents could then refer to the document later if they had any confusion or questions. Fowlie and Jackson (2007) also recommended suggesting that parents take notes during meetings with medical

professionals. If a NICU does not have a policy on parent communications, each professional should decide for herself how to best communicate with infants' parents.

Staff (team) education and collaboration.

In order to promote an organized and nurturing NICU environment, SLPs must work closely with all members of the NICU staff, including doctors, nurses, occupational therapists, and physical therapists, as well as others. According to Boswell (2002), some NICUs divide service delivery by specialty, while others employ a more transdisciplinary approach. In transdisciplinary practice, all members of the NICU team collaborate on an overall treatment plan for each infant, as opposed to each professional developing a separate intervention plan related to their specific specialty. Especially in NICUs utilizing a transdisciplinary approach, SLPs must be prepared to educate other members of the NICU team about infant developmental and feeding issues, so that the whole team can make educated decisions about these areas of infants' treatment. Since SLPs are the experts in the areas of feeding and communication development, they must be prepared to answer any questions that other NICU professionals may have regarding those areas.

Miller et al. (2001) described one example of a successful interdisciplinary team, in order to provide information for facilities considering this type of collaborative approach. The Interdisciplinary Feeding Team (IFT) operating in the Children's Hospital Medical Center in Cincinnati, Ohio, was composed of gastroenterologists, nurses, nutritionists, psychologists, occupational therapists, and speech-language pathologists. This team of professionals worked together to assess, diagnose, and treat feeding disorders in infants and children. Within this IFT, the SLPs' primary areas of expertise were oral motor skills and communication signals during feeding. As Boswell (2002)

discussed, the SLPs in this IFT were responsible for educating the other members of the team on their areas of expertise (Miller et al., 2001). In this case, the IFT found their interdisciplinary approach to be quite successful in the treatment of infants and children with feeding disorders.

Other Roles Speech-Language Pathologists Assume in the NICU

As well as the roles discussed above, SLPs also assume a variety of other roles in the NICU. Because of the interdisciplinary nature of NICU practice, SLPs will likely find themselves participating in collaborative tasks that are not specific to the speech-language pathology field. Areas such as quality control, risk management, and discharge planning are all essential parts of NICU service delivery, and as a member of the NICU team, SLPs may be expected to contribute to any or all of these areas.

Quality control and risk management.

In some hospitals, SLPs may be expected to contribute to programs intended to improve the quality and lower the risks associated with NICU care. Ballweg (2001) explained that the same developmental care plans that can improve infants' communication and feeding outcomes can also improve the overall quality of the NICU environment. By using the developmental care plan to create a nurturing, infant- and family-centered system, NICU professionals can improve both infants' medical outcomes and family satisfaction. Developmental care has been shown to decrease infants' overall length of stay in the NICU. In addition, a higher percentage of families reported being completely satisfied with their NICU experience when their facility was following a developmental care plan. Developmental care is an important quality control component that SLPs play a large part in maintaining.

In addition to quality control plans, SLPs can also contribute to risk management programs. Mahlmeister (2009) discussed risk factors associated with NICU staff members. The NICU may be a stressful work environment, due to patient sensitivity and parent expectations. When caring for infants in the NICU, every movement must be slow and precise in order to prevent overstimulation of the infants' fragile systems. In addition, the presence of parents in the NICU may increase the pressure to perform every task perfectly. When staff members feel frustrated with their work environment, they may take their frustrations out on each other, which creates a risk-filled environment. Because the NICU requires such intense collaboration, any discord between staff members creates the potential for miscommunication and negative effects on infants' care. Mahlmeister (2009) suggested that every NICU have a comprehensive plan for conflict resolution, and that every professional working in the NICU receive information about this plan. By helping to facilitate open collaboration, SLPs can help to decrease the occurrence of miscommunication in the NICU and the risks associated with it.

Discharge/transition planning and follow-up care.

When infants are discharged from the NICU, their care is far from complete. The major change is that parents or guardians become the infant's main caregivers rather than medical personnel. Preparing parents for their baby's transition from hospital to home care is extremely important. Every member of the NICU team should be involved in this preparation to ensure that parents completely understand their responsibilities following their baby's discharge. Parents should also be informed about follow-up services that are available for their baby, and should be encouraged to use these services.

The American Academy of Pediatrics' Committee on Fetus and Newborn (1998) proposed a set of guidelines for the NICU discharge process. The Committee recommended that infants' hospital stay be kept as short as possible, while still requiring a certain level of medical stability before discharge. Before an infant is discharged, the NICU staff should collaborate with caregivers to develop a plan detailing how the infant will be cared for in the home setting. The discharge planning team should include the parents, the primary care physician, the neonatologist, nurses, and any other professionals that have provided services to the infant during his time in the NICU.

Discharge planning should also include recommendations for follow-up care, based on the infant's current medical and developmental state. Als, Duffy, and McAnulty (1988) investigated the effectiveness of the Assessment of Preterm Infants' Behavior (APIB) (Als, Lester, Tronick, & Brazelton, 1982) for determining which infants would need more intensive follow-up care. The APIB assesses behavioral organization, as discussed earlier in this literature review. The researchers found that infants with lower scores of behavioral organization as measured by the APIB exhibited more developmental delays than those with higher APIB scores. Thus, the infants with lower APIB scores also needed a wider range of follow-up services due to their developmental delays. This study shows that measures of behavioral organization, including the APIB, can be used when preparing discharge plans for infants in the NICU.

Even when the NICU staff carefully plans for an infant's discharge, parents often do not fully comprehend discharge instructions and information on follow-up care. Mills, Sims, and Jacob (2006) found that parents were much more satisfied with discharge planning when they were given information throughout their child's NICU stay, rather

than all at once on the day of discharge. Parents who were given discharge information at several transition points during their baby's stay, such as at the transition from isolette to open-air crib or from gavage to full oral feeding, reported feeling much more prepared to care for their baby at home.

Similarly, information about follow-up services should also be distributed to parents throughout their infant's NICU stay. A study by Tien, Peterson, and Shelley (2002) evaluated factors that determined usage of NICU follow-up services. The study found that helpful medical personnel and clear discharge planning were usually the deciding factors in whether or not families used follow-up services. Most parents felt that they were responsible for coordinating their child's follow-up care, and many found this task overwhelming. However, the most commonly used follow-up service among families surveyed was speech and language therapy, which highlights SLPs' role in providing follow-up care.

Professional education and supervision.

Information on speech-language pathology practice, especially in the NICU, is constantly expanding. SLPs may attend conferences or workshops or participate in online courses to supplement their knowledge on topics related to NICU practice. Ziev (1999) reported that many SLPs finish graduate school without the specialized knowledge needed for a career in the NICU. SLPs can supplement their knowledge by researching, attending conferences, and meeting with other professionals in the field.

The National Association of Neonatal Therapists (NANT) is an organization that provides continuing education on NICU practice and emphasizes an interdisciplinary collaborative approach (Sturdivant and Ludwig, 2011). The term "neonatal therapist"

refers to any occupational therapist, physical therapist, or speech-language pathologist who provides services to at-risk infants in the NICU. The NANT provides an abundance of resources for professionals entering the NICU field, and can be one source of additional information on NICU practice. Though SLPs have been working in the NICU for over three decades, the percentage of all SLPs in the United States who provide NICU services is still quite small. As a result, SLPs entering a career in the NICU may find interdisciplinary organizations such as NANT more useful for their professional education than SLP-specific organizations.

In addition to furthering their own education, SLPs in the NICU may be asked to supervise graduate students preparing for a NICU career. The ASHA policy document *Knowledge and Skills Needed by Speech-Language Pathologists Providing Clinical Supervision* (ASHA, 2008) provides guidelines for professional supervision. As supervisors, SLPs serve as mentors and teachers. SLPs should be willing to establish a personal relationship with their supervisees and maintain an open line of communication at all times. By the end of the supervisory period, the graduate student should have exhibited competency in clinical assessment and intervention within the NICU. For graduate students hoping to enter NICU practice after graduation, the supervisory period is extremely important, since they may learn skills and techniques that were not introduced in their graduate programs. For SLPs in the NICU, professional supervision is a time-consuming yet much-needed responsibility.

Public education and advocacy.

SLPs working in the NICU may also be called on to participate in public awareness campaigns associated with their hospital or with private groups. According to

Billeaud (2003), many parents do not understand why their infant needs speech-language pathology services; consequently, hospitals or private groups may develop materials intended to provide public education and awareness about NICU services. For example, SLPs may collaborate with hospital public relations teams to develop informational pamphlets, or larger private advocacy groups may seek the help of an SLP with NICU experience when developing radio or television advertisements.

SLPs may also be called on to advocate for their presence in other hospitals with NICUs. Hospitals considering employing an SLP in their NICU may wish to meet with a NICU-experienced SLP from a neighboring hospital before making their decision. Billeaud (2003) reported that SLPs in this situation should have a specific outline prepared when meeting with hospital administrators. SLPs advocating for their position in the NICU should focus on the positive outcomes associated with services provided by SLPs. When speech-language pathology services are pitched as a quality improvement initiative for the NICU, hospitals are more likely to make the decision to add an SLP to their NICU staff. SLPs already employed in NICUs should be prepared to serve as consultants for other hospitals during their transition to full speech-language pathology services.

Research.

Because speech-language pathology is an evidence-based field, all clinical assessments and interventions should be based on previous research findings. Because the literature is constantly being revised, SLPs should stay up-to-date on important research related to their area of practice. Wambaugh and Bain (2002) recommended that SLPs not only read others' research but also conduct their own research to determine the

effectiveness of the services that they are providing. Case studies are the most practical type of research for practicing SLPs, especially in the NICU where some infants require relatively long hospitalizations. For example, an SLP could use slightly different intervention techniques with two infants, both born at thirty weeks gestation and both exhibiting feeding problems. The two infants' progress could then be compared and the results could be used to determine which intervention techniques were most effective. Wambaugh and Bain (2002) acknowledged that conducting research in a clinical setting may require significant time and resources, but asserted that providing services without documenting their effectiveness may ultimately be more costly. Research is a role that SLPs may or may not choose to include in their practice, and time and budget constraints may be deciding factors in this decision. There is an ongoing need for new research, however, and SLPs who do choose to conduct clinical research help not only themselves but other SLPs around the country.

ASHA Policy Documents

In the early 2000s, the American Speech-Language-Hearing Association (ASHA) recognized the need for clarification of SLPs' roles in the NICU. When SLPs first began entering NICU practice, they took on a variety of roles, although no official roles and responsibilities for this setting had been defined. In response, ASHA formed the Ad Hoc Committee on Speech-Language Pathology Practice in the Neonatal Intensive Care Unit. This committee drafted a set of policy documents on the roles of SLPs in the NICU. These documents included a position statement, technical report, guidelines document, and knowledge and skills document, and were approved by ASHA's Legislative Council in 2004. In addition, in 2002, another ASHA committee updated the policy documents on

the roles of SLPs providing treatment for swallowing and feeding disorders. These documents also hold great importance for NICU practice, since the majority of SLPs' NICU patients require feeding and swallowing interventions.

ASHA's *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b) stated ASHA's basic position that SLPs fill an essential and prominent role within the NICU setting. The position statement also organized the SLPs' roles in the NICU into four broad categories; (a) communication evaluation and intervention, (b) feeding and swallowing evaluation and intervention, (c) parent/caregiver education and counseling, staff (team) education and collaboration, and (d) other roles; which are the same categories used to divide this literature review. The *Roles of Speech Language Pathologists in the Neonatal Intensive Care Unit: Technical Report* (ASHA, 2004c) then described each role in detail and explained the rationale behind each role. The technical report also outlined some general principles for NICU service providers, including family-centered care and a collaborative approach. Finally, the *Roles and Responsibilities of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Guidelines* (2005) explained each role in even further detail, giving step-by-step instructions for each aspect of services in NICU. For example, this document explained exactly how to conduct a developmental assessment, including specific recommendations for useful standardized and non-standardized assessments. Together, the position statement, technical report, and guidelines document fully explain ASHA's view on the roles and responsibilities of SLPs working in the NICU.

Another ASHA policy document, *Knowledge and Skills Needed by Speech-Language Pathologists Providing Services to Infants and Families in the NICU*

Environment (2004a) works with the position statement, technical report, and guidelines to provide a complete picture of the expectations for SLPs in NICU practice. Rather than describing roles and responsibilities, this fourth document explained the specific knowledge and competencies needed to successfully provide services in the NICU. The document explained that SLPs seeking to enter NICU practice should have a base knowledge of infant anatomy and development, as well as collaborative techniques and team-based practice. Furthermore, the document listed specific knowledge and competencies associated with each of the roles that had been previously defined in the position statement, technical report, and guidelines. This document serves as a reference for SLPs who have recently entered the NICU field and gives clear direction for further education and research in any area where SLPs feel that they need additional expertise.

In addition to the documents on NICU practice, ASHA has also developed policy documents on SLPs' roles and responsibilities in the assessment and treatment of feeding and swallowing disorders. Since feeding treatment is such an integral part of NICU services, the feeding and swallowing documents are also excellent references for SLPs working in the NICU. The *Roles of Speech-Language Pathologists in Swallowing and Feeding Disorders: Position Statement* (ASHA, 2002b) states ASHA's position that because of SLPs' expertise related to the anatomy involved in the swallowing process, they are especially suited to performing feeding and swallowing assessments and interventions. The position statement then lists the approved roles and responsibilities related to feeding and swallowing, many of which were discussed earlier in this literature review. Finally, *Knowledge and Skills Needed by Speech-Language Pathologists Providing Services to Individuals with Swallowing and/or Feeding Disorders* (ASHA,

2002a) explained the knowledge and competencies associated with each of the feeding and swallowing roles, just as the knowledge and skills NICU document (ASHA, 2004a) explained the knowledge needed for roles in the NICU.

Research Questions

Based on personal interests, interviews with SLPs, observation in the NICU, and a review of the literature, the author formulated three hypotheses to be investigated in this study.

1. SLPs with a Masters degree and a Certificate of Clinical Competence were not knowledgeable about the roles and responsibilities of the SLP in the NICU that were identified in ASHA's policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b).
2. SLPs with a Masters degree and a Certificate of Clinical Competence did believe that the single role of the SLP in the NICU was in the treatment of feeding and swallowing disorders.
3. A majority percentage of the SLPs with a Masters degree and a Certificate of Clinical Competence believed that they were prepared to work in the NICU following completion of their graduate programs.

CHAPTER III

METHODOLOGY

Participants

Participants for this study were ASHA-certified, master's-level speech-language pathologists (SLPs) from across the United States, identified both by searching the ASHA member directory and by contacting hospitals directly. For inclusion in the study, the SLPs were required to hold a Certificate of Clinical Competence (CCC) and to have had at least one year of experience in a medical setting following their clinical fellowship year. For the purpose of this study, medical settings included hospitals and outpatient rehabilitation centers. The participants were surveyed by use of an electronic survey instrument with a link to the survey sent to each participant.

In order to randomize participant selection, the SLPs' email addresses were not organized in any particular order and were not grouped by state, organization, or any other meaningful criteria. The survey email was initially sent to 318 SLPs identified by contacting hospitals and requesting SLPs' email addresses. This group of participants was sent follow-up emails at 14 days and 21 days following the initial distribution. According to Sheehan (2001), follow-up messages can increase the response rate in both postal mail and email surveys, and multiple follow-ups result in higher response rates than one-time follow-ups. Due to a low response rate, 200 additional participants were identified by searching the ASHA member directory, limiting the search criteria to CCC-SLPs whose

work setting was listed as a hospital. This second group of participants was then sent follow-up emails at 7 and 14 days after the original mailing.

In order to obtain informed consent of the participants, a letter was included in the body of the email explaining the purpose of the study. The letter explained that by completing the survey, the participant was giving permission for their responses to be included in the study. The letter also mentioned that a copy of the results would be available to the participant. In order to deliver a copy of the results while still maintaining confidentiality, a question at the end of the survey asked the participants to provide their email addresses if they wished to receive the results of the study. To further ensure confidentiality, all data gathered will be destroyed one year following the completion of the study.

In this initial study, relatively broad criteria were used to select participants within the speech-language pathology field. The criteria for this study were chosen because the researcher wished to investigate the knowledge of members of the field as a whole about Neonatal Intensive Care Unit (NICU) practice. This study provided general information about masters-level, ASHA-certified SLPs' familiarity with the NICU, and provided a basis for possible future research in this area. In the future, this study could be redesigned to investigate the knowledge of SLPs who are currently working in the NICU or have had NICU experience in the recent past.

Instrumentation and Electronic Communication

Survey questions were developed based on the ASHA policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (ASHA, 2004b). The survey questions were designed to measure SLPs' familiarity with

specific areas of NICU practice, as well as their professional opinions about the SLPs' roles in the NICU. In addition, the survey measured the SLPs' preparedness for work in the NICU setting upon graduation from their graduate programs.

The survey's first question included a list of all of the roles of SLPs in the NICU as listed in the ASHA position statement (2004b) and asked the participants to select all the roles that they believed apply to SLPs. This question was designed to determine how many of the roles were familiar to the participants. Questions two and three asked about whether the participants' graduate programs prepared them for a NICU career, and question four asked about any continuing education on NICU practice the participants had completed. Question five asked the participants' opinion on SLPs' main role in the NICU, and question six asked their opinion on occupational therapists or other healthcare professionals assessing and treating feeding and swallowing disorders in the NICU. Questions seven through seventeen then asked about the participants' familiarity with specific roles that SLPs can fill in the NICU.

The survey was formulated using Qualtrics Survey Software through the University of Mississippi's subscription (Qualtrics, 2011). Qualtrics is a program for creating and distributing surveys and reporting data collected from surveys. Qualtrics contains over one hundred possible question types, from simple multiple choice to advanced interactive data entry. The software also provides a variety of distribution options; for example, the user can build participant lists from outside address books and schedule automated reminder emails. Finally, Qualtrics can report survey results in different ways according to the user's needs. Data can be reported for each question or

for each individual respondent. This software includes over thirty types of graphs for viewing collected data, allowing the user many options for viewing and analyzing data.

For this study, the survey consisted of seventeen questions. The survey was created using only the multiple choice format in order to allow participants to complete the survey quickly and easily. The first question, which asked the participants to select all of the roles that should apply to SLPs in the NICU, allowed multiple answers; the remainder of the questions allowed only a single answer to be selected. The survey software recorded the survey responses as they were completed and the data from completed surveys was available for viewing at any time.

Statistical Analysis

The survey software provided a graph for each question, summarizing the respondents' answers. The data was then analyzed using types of central tendency statistics (mean, median, and mode).

CHAPTER IV

RESULTS

This study was designed with three main purposes. The first purpose was to determine speech-language pathologists' (SLPs') familiarity with their roles within the Neonatal Intensive Care Unit (NICU), as defined in the American Speech-Language Hearing Association (ASHA) policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b). The second purpose of this study was to determine SLPs' professional opinions on what their main role in the NICU should be. The final purpose was to determine the percentage of SLPs who felt prepared to provide services in a NICU setting upon completion of their graduate programs. As stated at the end of the literature review, the research hypotheses were:

1. SLPs with a Masters degree and a Certificate of Clinical Competence were not knowledgeable about the roles and responsibilities of the SLP in the NICU that were identified in ASHA's policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement*.
2. SLPs with a Masters degree and a Certificate of Clinical Competence did believe that the single role of the SLP in the NICU was in the treatment of feeding and swallowing disorders.
3. A majority percentage of the SLPs with a Masters degree and a Certificate of Clinical Competence believed that they were prepared to work in the NICU following completion of their graduate programs.

A survey for masters-level SLPs with Certificates of Clinical Competence, who work in medical settings, was developed and sent to selected SLPs via email. The questions were designed to investigate the SLPs' opinions regarding which roles SLPs should have within the NICU, their education on NICU practice, and their familiarity with specific roles and responsibilities that SLPs can hold in the NICU. Electronic surveys were initially emailed to 318 SLPs, and the recipients were asked to forward the email to others who might be eligible to participate. Because of a low response rate, surveys were later emailed to 200 additional SLPs. There were 140 total responses to the survey, and the following are the results of those responses.

Results

Question one of the survey asked the respondents to identify all of the roles that they thought should be included in SLPs' responsibilities in the NICU. The question was followed by sixteen answer choices, and the respondents were able to select any or all of the choices. Each answer choice was a role or responsibility identified as belonging to SLPs working in the NICU by the ASHA policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b). According to the position statement, not every SLP working in the NICU will fill every one of these roles; however, each of the roles or responsibilities listed as answer choices for question one have been named by ASHA as appropriate for SLPs in the NICU. In other words, each of the roles listed in question one can be, but will not always be, included in SLPs' responsibilities in the NICU.

The purpose of question one was to determine which roles SLPs commonly associate with their practice in the NICU, and which roles they most often do not identify

as responsibilities SLPs should hold. The responses to this question illustrate the SLPs' familiarity with each of their NICU roles and responsibilities. By surveying SLPs from across medical settings, the researcher was able to determine which roles are common knowledge among SLPs and which are not as familiar. Because of differences among graduate school programs, SLPs who graduated from different programs may have different knowledge bases concerning NICU practice. In addition, some SLPs may have completed continuing education on NICU practice, while others may not have participated in any continuing education related to this setting. This question can determine which topics receive adequate attention and which topics need to be further emphasized in both graduate programs and continuing education.

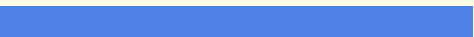

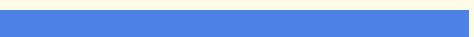

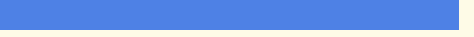





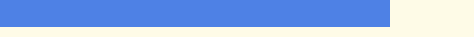



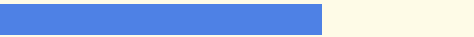

Role		Responses	%
Parent education and counseling		138	99%
Clinical feeding and swallowing assessment		137	99%
Feeding and swallowing intervention		137	99%
Staff education		135	97%
Follow-up services		134	96%
Interdisciplinary collaboration		134	96%
Instrumental feeding and swallowing assessment		130	94%
Discharge planning		129	93%
Contributing to developmental care		127	91%
Supervision of graduate students		120	86%
Developmental intervention		114	82%
Public education and advocacy		102	73%
Quality control/risk management		99	71%
Communication assessment		96	69%
Assisting with breastfeeding		94	68%
Neurodevelopmental assessment		88	63%

Figure 1. Percentage of SLPs Surveyed Who Identified Each Role as One That Should Be Included in SLPs' Responsibilities in the NICU (n=139)

Figure 1 shows the results of question one. The roles that were identified most often were parent education and counseling, clinical feeding and swallowing assessment, and feeding and swallowing intervention, which were all identified by 99% of the respondents. These results show that SLPs most commonly associate these roles with speech-language pathology practice in the NICU. As shown in Figure 1, several other roles were also consistently identified as belonging to SLPs working in the NICU. This demonstrates that SLPs are, in fact, familiar with many of their roles within the NICU. The roles that were most commonly not identified were communication assessment, assisting with breastfeeding, and neurodevelopmental assessment, which were each identified by less than 70% of the responding SLPs. These results reveal that these three roles were the least familiar among SLPs.

Questions two, three, and four investigated how and when the SLPs surveyed had gained knowledge about their roles and responsibilities within the NICU. Question two asked whether or not the participants' graduate school curriculums included any courses on NICU practice. The purpose of this question was to determine whether speech-language pathology graduate programs across the country are attempting to prepare their students for work in the specialized NICU environment. Graduate schools should provide the knowledge base for speech-language pathology practice; consequently, if schools do not provide courses on every area of practice, SLPs may enter some work settings without the proper background knowledge they need to begin evaluating and treating clients. Especially in a specialized area such as the NICU, appropriate background education is essential for successful practice.

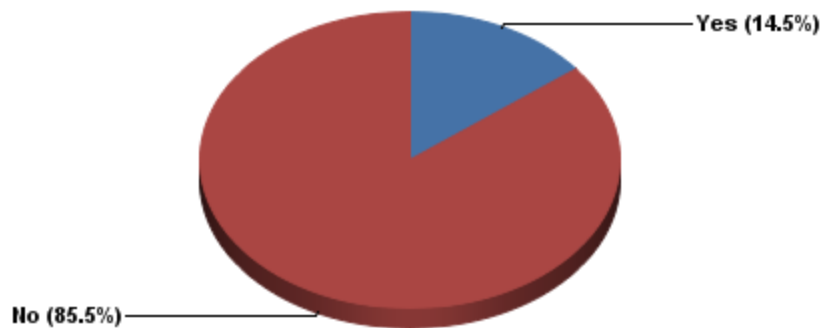


Figure 2. Presence of NICU Practice Courses in Graduate Programs Attended by Responding SLPs (n=138)

The results of question two are displayed in Figure 2. A majority of the respondents reported that their graduate programs did not include any courses on NICU practice. These results identify a missing element in the knowledge base that many graduate programs are providing. As more SLPs enter NICU practice and take on a wide variety of roles and responsibilities, proper education becomes even more important. In the future, graduate school programs should attempt to give sufficient attention to the NICU setting and provide students with an entry-level knowledge of NICU practice.

Question three is closely related to question two in that it also investigated the responding SLPs' exposure to information on the NICU while in graduate school. Question three asked the participants whether or not they felt prepared for a career in the NICU upon completion of their graduate programs. While question two asked about specific coursework that was or was not made available in the participants' graduate programs, question three asked the participants to make a personal judgment of their own preparedness for NICU practice at the time of their graduation. According to Ziev (1999),

many SLPs complete their graduate programs still lacking the specialized knowledge needed for a career in the NICU. The purpose of this question was to determine whether the courses or information provided by graduate programs about NICU practice, if any, were thorough enough to allow the respondents to feel prepared for work in that setting.

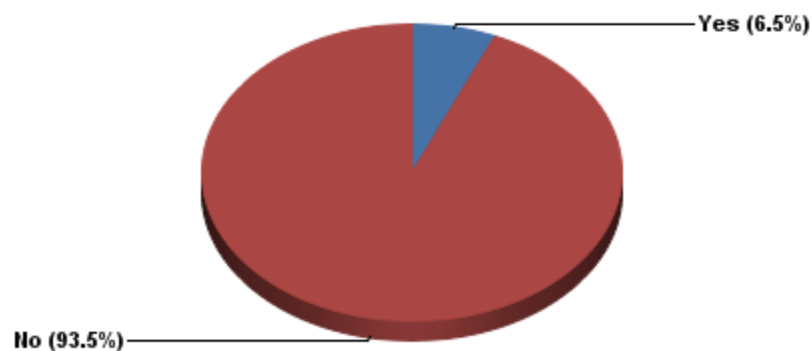


Figure 3. SLPs Who Felt Prepared for a NICU Career upon Completion of Their Graduate Program (n=139)

The results of question three are found in Figure 3. The results from question two showed that a minority of the respondents (14.5%) had received education on NICU practice during graduate school. Likewise, the results from question three showed that an even smaller minority (6.5%) of responding SLPs actually felt prepared to enter NICU practice upon completion of their graduate programs. These results suggest that even those schools that do provide a knowledge base on the NICU do not provide enough education to ensure that their graduates can enter practice in that setting with confidence. Graduate programs should strive to fully address practice in the NICU setting in their

curriculum, including education on all of the roles and responsibilities that SLPs can hold within that setting.

Question four asked the SLPs whether they had participated in any seminars, conferences, or continuing education courses in order to gain further knowledge and skills related to speech-language pathology practice in the NICU. This question was designed as a follow up to questions two and three. The purpose of question four was to determine what percentage of SLPs had a need or desire to be further educated about NICU practice and had independently chosen to participate in post-graduate education on the subject. The results of this question can be used to infer SLPs' perceptions of their need for NICU-related education. Especially if NICU practice was not covered in their graduate school curriculums, SLPs may recognize the need to participate in continuing education in order to be prepared for work in the NICU.

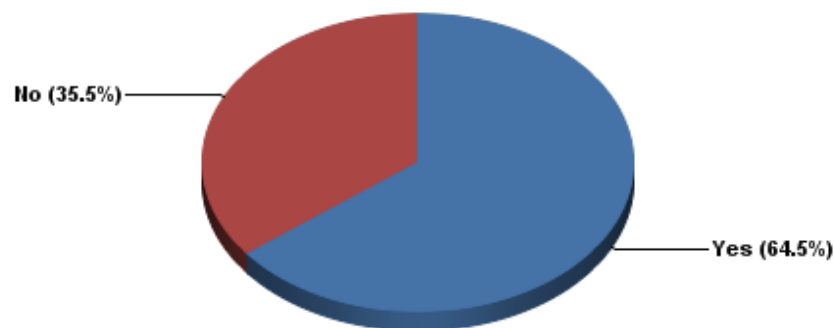


Figure 4. SLPs Who Had Participated in Continuing Education on NICU Practice (n=138)

The results of question four, displayed in Figure 4, demonstrate that 64.5% of the responding SLPs did feel some need or desire to gain further education on NICU practice, and, to that end, participated in seminars, conferences, or continuing education courses. The results show a large difference between the percentage of SLPs who felt prepared for a career in the NICU upon completion of graduate school (6.5%) and the percentage of SLPs who participated in some sort of post-graduate school education on NICU practice (64.5%). This discrepancy shows that many of those who did not receive adequate NICU education in graduate school did further their knowledge of NICU practice after graduation. These results demonstrate that many SLPs needed education related to their roles in the NICU, and that this subject was either not adequately addressed in their graduate programs, or was not covered at all. Continuing education courses, by definition, should expand on a base of knowledge gained in graduate school. In the future, graduate programs should strive to provide at least introductory courses on NICU practice, so that SLPs' first education on the setting is not self-directed in the form of seminars, conferences, or continuing education courses.

Question five was designed to measure the SLPs' general opinion of what their main role in the NICU should be. When preparing the literature review for this thesis, the author discovered that most resources on NICU practice written specifically for SLPs focused on feeding and swallowing evaluation and intervention. Although communication and developmental assessment and intervention is the role listed first in the ASHA position statement (2004b), the researcher had to look outside speech-language pathology journals and publications to find information on this role. Due to the lack of SLP-specific resources on communication and developmental assessment and

intervention, the researcher hypothesized that a majority of SLPs would believe that their main role in the NICU was in the treatment of feeding and swallowing disorders.

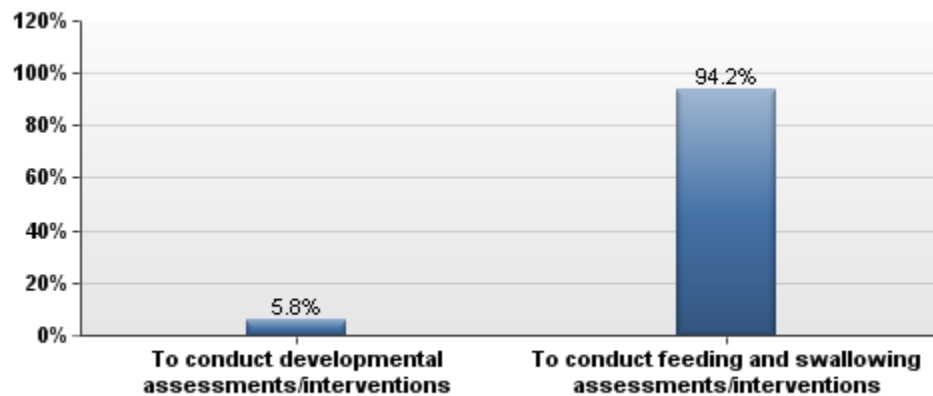


Figure 5. SLPs' Main Role in the NICU, According to Responding SLPs (n=139)

The purpose of question five was to test this hypothesis. As shown in Figure 5, an overwhelming majority (94.2%) of the respondents identified feeding and swallowing assessments and interventions as SLPs' main role in the NICU. While treating feeding and swallowing disorders is an important part of SLPs' job in the NICU, it might not always be their main role. For some babies, such as those who are in the NICU for reasons other than feeding issues, SLPs' main role in their treatment is to promote proper communication and neurobehavioral development (Als & Brazelton, 1981; Mouradian, Als, & Coster, 2000). The results of question five demonstrate that a significant majority of SLPs believe that their main role in the NICU is in feeding and swallowing assessments and interventions. These results correlate with the results of question one, in which 99% of the respondents identified feeding and swallowing evaluation and intervention as proper roles for the SLP in the NICU, while only 69% identified

communication assessment and even fewer (63%) identified neurodevelopmental assessment. In order to supplement SLPs' knowledge about the other roles they can fill in the NICU, more resources specific to speech-language pathology should be written and published focusing on these other roles. If speech-language pathology journals begin to publish articles on NICU practice focusing on areas other than feeding and swallowing evaluation and intervention, SLPs can become more familiar with the situations in which other roles, such as developmental intervention, can be SLPs' main NICU responsibility.

Question six of the survey investigated the respondents' opinion on professionals other than SLPs conducting feeding and swallowing evaluations and interventions in the NICU. While some NICUs still divide service delivery by specialty, others are moving toward a more collaborative, interdisciplinary approach (Boswell, 2002). The National Association of Neonatal Therapists (Sturdivant & Ludwig, 2011) is a recently-formed organization that supports this interdisciplinary model, in which occupational therapists, physical therapists, and speech-language pathologists work together in the NICU as "neonatal therapists" and provide a full range of therapy services (Sturdivant & Ludwig, 2011). Under this model, physical and occupational therapists, along with SLPs, can provide feeding and swallowing services to infants in the NICU. The purpose of question six was to gauge SLPs' opinion of this transition to interdisciplinary care and determine whether they felt that SLPs are the only professionals qualified to perform feeding and swallowing evaluations in the NICU.

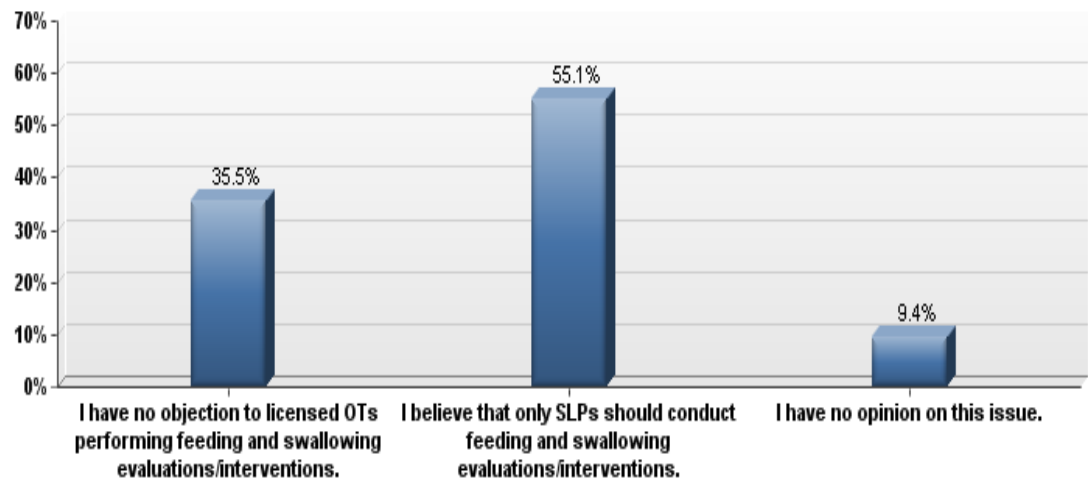


Figure 6. SLPs' Feelings About Other Professionals' Participation in Feeding and Swallowing Evaluation and Intervention in the NICU (n=138)

Figure 6 displays the results of question six. Only a slight majority (55.1%) of the respondents believed that only SLPs should conduct feeding and swallowing evaluations and interventions. Thirty-six and a half percent had no objection to licensed occupational therapists conducting feeding evaluations and interventions, and 9.4% had no opinion on the issue. These results demonstrate that although most SLPs felt that treating feeding problems was their main role in the NICU (Question 5), many of the responding SLPs had no objection to sharing that role with other professionals. Thirty-six and a half percent of the SLPs implied that they were open to the interdisciplinary approach which NICU practice seems to be trending toward. Further research is needed to confirm the merits of interdisciplinary NICU practice, as well as to determine whether or not SLPs are correct in their reluctance to share their responsibilities in the area of feeding and swallowing treatment with other professionals.

Questions seven through seventeen investigated the SLPs' familiarity with or participation in some of the specific NICU roles described in ASHA's *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Technical Report* (2004c). Evidentiary support for each of these roles was provided in the literature review section of this thesis. Overall, the purpose of questions seven through seventeen was to determine which roles were more or less familiar to the respondents. Each of these questions required a "yes" or "no" response and did not require the SLPs to explain any of their answers. The results of these questions show which roles SLPs are sufficiently knowledgeable about and which roles need to be addressed more thoroughly in both graduate school curriculums and continuing education offerings.

Question seven asked the SLPs about their familiarity with neurodevelopmental assessments of infants. As discussed in the literature review, assessment of communication and neurodevelopment in preterm, low birth weight infants is extremely important (Nagy, 2008; Buhler, Limongi, & Albuquerque Diniz, 2009; Scheffler et al., 2007). According to Buhler et al. (2004), preterm and very low birth weight infants are significantly more likely to exhibit communication and developmental delays than term infants. Early diagnosis of these delays allows for timely intervention that can minimize adverse effects for the baby (Scheffler et al., 2007). There are a wide variety of assessments that can be used to diagnose developmental delays in infants, including both standardized and judgment-based assessments (Billeaud, 2003). One commonly used standardized assessment of neurobehavior is the Assessment of Preterm Infants Behavior (Als, Lester, Tronick, & Brazelton, 1982). Whatever the method used,

neurodevelopmental assessment is an important part of SLPs' responsibilities in the NICU.

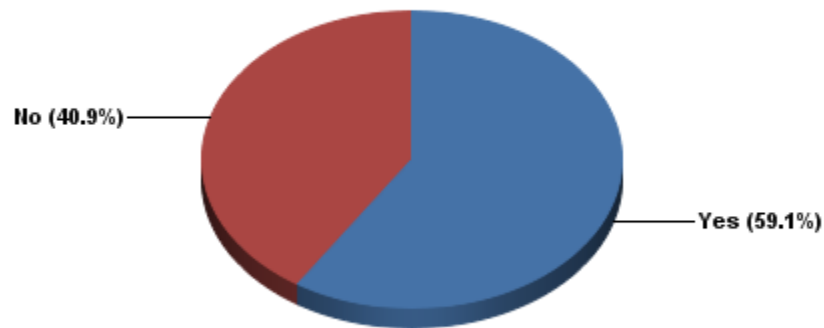


Figure 7. SLPs' Familiarity with Neurodevelopmental Assessments of Infants (n=137)

As displayed in Figure 7, a majority of the respondents reported that they were familiar with neurodevelopmental assessment of infants. However, 40.9% of the respondents were not familiar with this type of assessment, which illustrates that there is still room for more education on this topic. Assessment is the essential first step in beginning to treat infants with developmental and neurobehavioral delays. Therefore, SLPs should be familiar with assessment techniques so that they can determine which infants to target for intervention.

Question eight investigated the SLPs' familiarity with intervention techniques to facilitate social, interactive communication in infants. Some commonly-used evidence-based intervention techniques are promoting mother-infant interaction (Cerezo, Pons-Salvador, and Trenado, 2008; Xu & Filler, 2005), kangaroo care (Ludington-Hoe, Thompson, Swinth, Hadeed, & Anderson, 1994; Victor and Persoon, 1994), and

therapeutic positioning (Hunter, 2004). Each of these components is important for facilitating proper development in preterm, low birth weight infants. High-quality mother-infant interaction has been shown to have a significant positive effect on infants' communication and language development (Cerezo et al., 2008). Likewise, proper positioning and swaddling, used to make the baby's environment as much like the womb as possible, promotes successful neurobehavioral development, which, in turn, promotes communication development (Hunter, 2004).

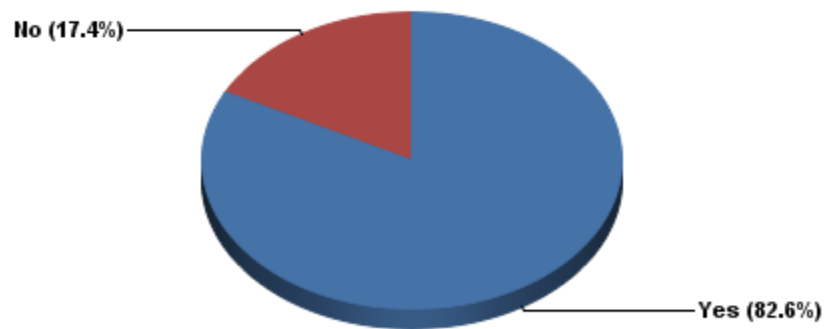


Figure 8. SLPs' familiarity with Intervention Techniques to Facilitate Social, Interactive Communication in Infants (n=138)

The results of question eight are shown in Figure 8. Slightly more than 80% of the respondents were familiar with communication interventions for infants, a promising statistic in light of the fact that an overwhelming majority of SLPs did not view communication and developmental intervention as their main role in the NICU (Question 5). The results of this question demonstrate that although SLPs may not believe that communication assessment and intervention is their primary NICU role, most are, in fact, informed about the topic.

Question nine asked the SLPs if they were familiar with clinical and instrumental evaluations of feeding and swallowing and intervention techniques to facilitate safe feeding and swallowing in infants. The evidence supporting SLPs' involvement in this role is extremely strong. In relevant studies, gestational age and birth weight have consistently been predictors of feeding success (Bingham, Ashikaga, and Abbasi, 2010). In other words, the earlier a baby is born and the less he weighs when he is born, the lower his rate of successful feeding will be. Assessments of an infant's feeding and swallowing abilities are conducted primarily through bedside clinical assessments (Thoyre, Shaker, & Pridham, 2005; Billeaud, 2003; Swigert, 2010). In some cases, instrumental swallow studies are used to gain more information about the pharyngeal and esophageal phases of a baby's swallow (Swigert, 2010). After feeding and swallowing difficulties have been assessed, SLPs use intervention techniques to increase readiness for oral feeding, develop rooting and sucking reflexes, and facilitate successful oral feeding (Arvedson, Clark, Lazarus, Schooling, & Frymark, 2010; Swigert, 2010).

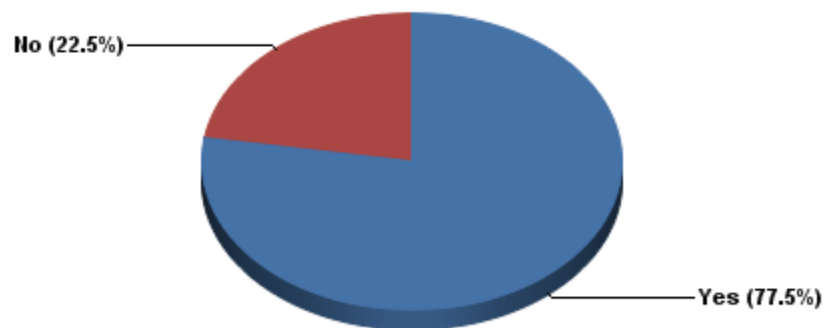


Figure 9. SLPs' Familiarity With Feeding and Swallowing Evaluations and Interventions for Infants (n=138)

The evidence for SLPs' involvement in this particular role is overwhelming, and the majority of the respondents felt that feeding and swallowing evaluation and intervention should be their main role in the NICU (Question 5). However, as shown in Figure 9, only 77.5% of the respondents were familiar with the specifics of this role. That percentage does represent a majority; however, 94.2% of the SLPs identified treatment of feeding and swallowing disorders as their main NICU role. The discrepancy between these two percentages reveals that some of those who believe that SLPs should be involved in feeding and swallowing evaluations and interventions in the NICU are not familiar with the specifics involved in carrying out this role. In the future, more information should be made available to SLPs about this role, so that they can feel confident participating in this extremely important aspect of NICU practice.

Question ten investigated whether the SLPs had the knowledge to interpret infants' cues during feeding. SLPs are communication experts; consequently, this area of feeding intervention is perfectly suited to SLPs' knowledge base (ASHA, 2004c). Interpreting feeding cues is essential because research has shown that if preterm infants are encouraged to bottle feed before they are physiologically or behaviorally ready, they may experience increased stress and fail to make necessary progress (McGrath and Bodea Braescu, 2004). In addition, studies have shown increased success when infants are fed according to their individual cues instead of on a predetermined schedule (McGrath, 2004; McCain, 2003). In order to follow the recommendations of these researchers, someone in the NICU must be able to accurately interpret infants' cues, a role that is often assumed by the SLP.

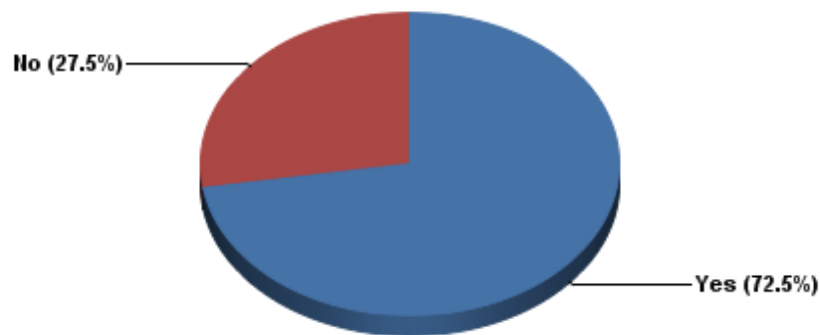


Figure 10. SLPs with the Knowledge to Interpret Infants' Cues during Feeding (n=138)

As indicated in Figure 10, 72.5% of the respondents did have the knowledge necessary to interpret infants' cues during feeding, while 27.5% did not. Once again, a majority of the respondents were familiar with this aspect of feeding and swallowing intervention in the NICU. However, the 27.5% that were not familiar with this role demonstrate the need for an increase in the availability of resources on this area of NICU practice, especially since interpreting infants' cues is arguably one of the roles that is most specific to SLPs' knowledge base.

Question eleven asked about the SLPs' familiarity with ways to contribute to a family-centered environment, including developmental care and parent education and counseling. Family-centered care is the cornerstone of the NICU environment. Parents and other family members are an integral part of every newborn's life, and parents should be kept informed and included in all decision-making regarding their baby's care (Swift & Scholten, 2010). Patient- and family-centered care has been proven to positively affect

both family satisfaction and overall medical outcomes (Shaller, 2007). Developmental care is an important part of the patient-centered environment in the NICU. According to Aita and Snider (2003) and Als (1998), developmental care is a system of NICU operation which relies on interaction between the infants and caregivers. In a developmental care setting, each infant's care is individualized for his specific needs. Aita and Snider (2003) and Als (1998) both also reported positive outcomes stemming from developmental care. All professionals in the NICU should participate in the developmental care model, including SLPs. In addition, parent education and counseling is a vital component of the family-centered care model. Parents should be viewed as active collaborators in their baby's care, rather than uneducated outsiders (Swift & Scholten, 2010). SLPs should provide parents with information about their specific roles in the infant's care, and should always be willing to answer any questions that parents might have.

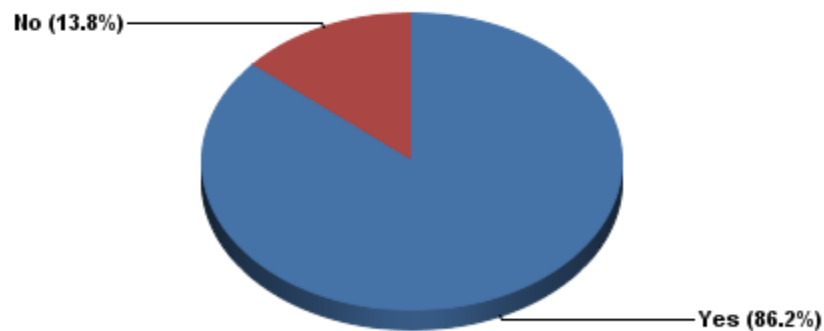


Figure 11. SLPs' Familiarity with Ways to Contribute to a Family-Centered Care Environment (n=138)

As shown in Figure 11, a majority (86.2%) of the responding SLPs reported being familiar with family-centered care and its components. Because SLPs participate in parent education in many other areas of practice, they are likely especially familiar with that component of creating a family-centered environment. However, some may be less familiar with the NICU-specific concept of developmental care, which could account for the 13.8% of respondents who answered “no” to this question. Overall, the results of this question demonstrated that the majority of the SLPs surveyed were well-informed about their roles related to family- and patient-centered care in the NICU.

Question twelve investigated whether the SLPs were involved in interdisciplinary collaboration with other health care professionals such as occupational therapists, physical therapists, lactation consultants, and nurses. The NICU is a setting that calls for active collaboration among professionals. Current trends in NICU practice are moving towards a transdisciplinary model, in which all of the professionals in the NICU work together to plan and provide the babies’ care, rather than dividing service delivery by specialty (Boswell, 2002). In a setting such as the NICU that emphasizes collaboration, SLPs must be able to not only do their own job successfully, but also work with other professionals to provide the best care possible.

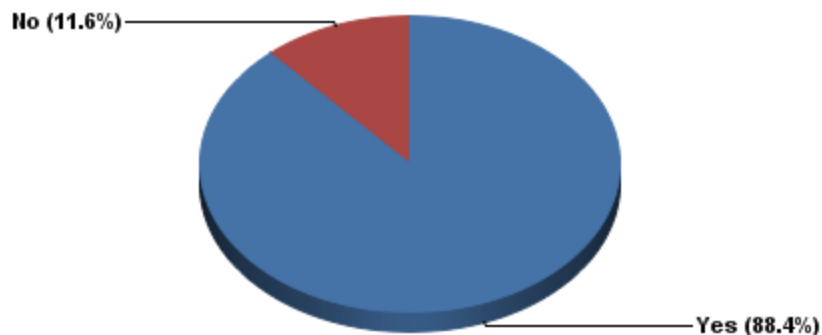


Figure 12. SLPs' Involvement in Interdisciplinary Collaboration (n=138)

As Figure 12 illustrates, 88.4% of the respondents reported being involved in interdisciplinary collaboration. This is another role that is not specific to the NICU setting, which may account for the high number of “yes” responses. SLPs collaborate with other professionals in almost any setting in which they work, and likely would have little trouble carrying their collaborative experience over to NICU practice. The 11.6% of respondents who answered “no” to this question may not have any experience with interdisciplinary collaboration, or may have only collaborated with professionals other than those listed in this question. A collaborative atmosphere should continue to be encouraged within the NICU, as interdisciplinary care has been shown to enhance outcomes for infants (Miller et al., 2001).

Question 13 asked about the SLPs' knowledge of the quality control and risk management programs for the NICU in their facility. As a member of the NICU team, SLPs may be asked to participate in quality control and risk management efforts. According to Ballweg (2001), some SLPs participate in quality control without even

realizing that they are involved, simply by contributing to a developmental care plan. Developmental care is one of many NICU interventions that has been proven to improve the quality of services by increasing both infants' medical outcomes and family satisfaction. Likewise, while some SLPs are involved in implementing specific risk management measures, others contribute to risk management simply by doing their jobs well. Open communication between professionals is one component of risk management in which SLPs are likely to be involved (Mahlmeister, 2009).

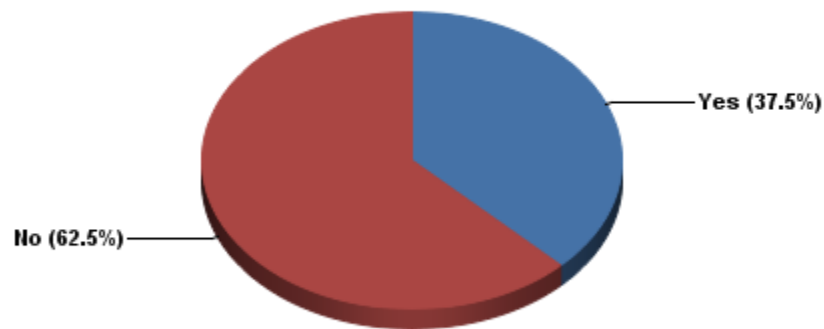


Figure 13. SLPs' Knowledge about Quality Control and Risk Management Programs for the NICU in Their Facility (n=136)

The results of question thirteen, displayed in Figure 13, show that a majority of the respondents were not knowledgeable about the quality control and risk management programs for the NICU in their facility. One possible explanation for these results is that, as explained above, some SLPs may participate in quality control and risk management without even realizing that they are doing so. Simply doing one's job well and facilitating collaboration by maintaining an open line of communication with other professionals improves the quality of services and minimizes risk. However, if SLPs are expected to

actively and consciously participate in these roles, they should be informed about specific plans and goals that administrators have developed for the facility. By making SLPs more knowledgeable about their roles in quality control and risk management, hospitals can ensure that these responsibilities are successfully carried out.

Question fourteen asked whether the responding SLPs participated in discharge planning for babies in the NICU. Before babies are discharged from the NICU, a plan must be put in place detailing how the baby will be cared for at home and what follow-up services he will receive. When a baby leaves the hospital, the parents become responsible for his care. According to the American Academy of Pediatrics' Committee on Fetus and Newborn (1998), the NICU staff should collaborate with caregivers to develop a plan detailing how the infant will be cared for in the home setting. SLPs are an important part of this collaboration, and are often responsible for making sure that parents understand any special feeding techniques that must be used with their baby. In addition, recommendations for follow-up care should be made at the time of discharge, and parents should be given specific information about how and when follow-up care will take place (Als, Duffy, & McAnulty, 1998). SLPs can provide information about any speech and language services the child may need in the future. Discharge planning is extremely important for infants who have been cared for in the NICU and may determine an infant's success as he transitions to life at home.



Figure 14. SLPs' Participation in Discharge Planning for Babies in the NICU (n=136)

The results of question fourteen, displayed in Figure 14, reveal that only 35.3% of the respondents reported participating in discharge planning for NICU babies. This is a troubling statistic, since discharge planning plays such an important part in ensuring infants' future success. The results of this question show that more education is needed on this topic both for hospitals and for SLPs. Hospitals should be made more aware of the importance of including SLPs in discharge planning. In addition, SLPs should be provided more information detailing what their role in discharge planning can involve. If SLPs are sufficiently educated about the important role they fill in discharge planning, they may be more likely to insert themselves into this key component of babies' transition from hospital to home.

Question fifteen asked the SLPs if they have ever supervised a graduate student or clinical fellow. Supervision is a time-consuming yet important role that many SLPs are asked to fill at some point in their career. The first set of people who need supervision are graduate students, who are required to complete a specific number of supervised clinical

practicum hours. The second category consists of SLPs who have completed graduate school but are not yet ASHA certified. ASHA requires SLPs to work in a supervised setting for thirty-six weeks (full time) post-graduation, a period often referred to as the clinical fellowship year, before they are eligible to apply for a Certificate of Clinical Competence (ASHA, 2008). As supervisors, SLPs serve as mentors and teachers. For graduate students hoping to enter NICU practice after graduation, the supervisory period is extremely important, since they may learn skills and techniques that were not introduced in their graduate programs (ASHA, 2008).

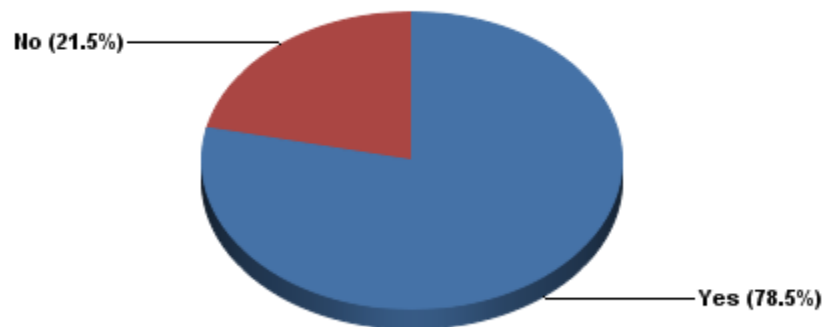


Figure 15. SLPs Who Had Supervised a Graduate Student or Clinical Fellow (n=135)

Figure 15 displays the results of question fifteen. Seventy-eight and a half percent of the respondents reported that they have supervised a graduate student or clinical fellow at some point in their career. The fact that supervision is not a role specific to the NICU may account for the high percentage of respondents who reported having supervision experience. The SLPs may have had experience with this role even if they have not had any experience in the NICU setting. SLPs should continue to be encouraged to act as

supervisors for students and clinical fellows. Although supervising can be time-consuming, it is an important part of students' training for a career in speech-language pathology. Especially in a setting such as the NICU, which may be only briefly covered in graduate school curriculums, the hands-on learning and mentoring that a supervisor provides are vital to students' education.

Question sixteen asked the SLPs if they have participated in public education and advocacy about services available in their areas for the newborn population. Some SLPs may be asked by their employers to participate in public education and advocacy, while others may choose to participate on their own. Likewise, some public education or advocacy campaigns are run through hospitals, and others are backed by private organizations. SLPs working in the NICU may collaborate with other professionals to develop informational pamphlets for parents about NICU services (Billeaud, 2003). SLPs can also work with organizations on public awareness campaigns involving newborn health and safety. These are only two of many possible ways that SLPs can be involved in public education and advocacy. This is a role that should not be overlooked, as it is important in every profession, including speech-language pathology.

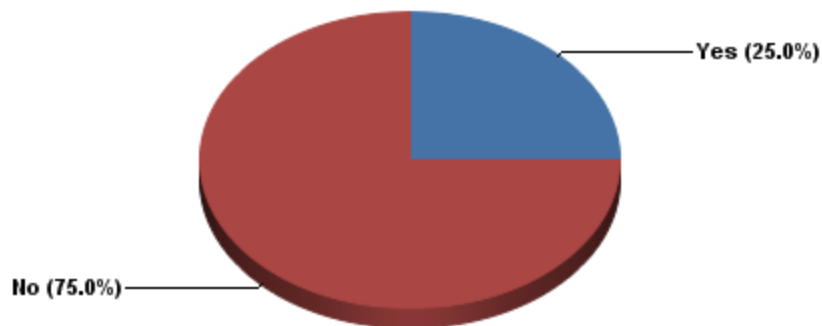


Figure 16. SLPs' Participation in Public Education and Advocacy about Services for the Newborn Population (n=136)

As shown in Figure 16, only 25% of the respondents had participated in public education and advocacy about services for newborns. One possible explanation for this low percentage is that this particular role can take many forms, so some SLPs may participate in tasks that might be considered public education or advocacy but are not labeled as such. These results reveal that more information is needed for SLPs regarding the importance of public education and advocacy and ways that they can become more involved in this role, in order to better inform parents about services for their babies and to better inform other hospitals about the need for SLPs in their NICUs (Billeaud, 2003).

Question seventeen asked the SLPs whether they had participated in or directed any type of behavioral research through the NICU. Since speech-language pathology is an evidence-based field, SLPs should stay up to date on current research findings. However, according to Wambaugh and Bain (2002), SLPs should also conduct their own research whenever possible. The most direct way for SLPs to engage in evidence-based

practice is to conduct case studies of their own patients in order to determine the effectiveness of the services they are providing.

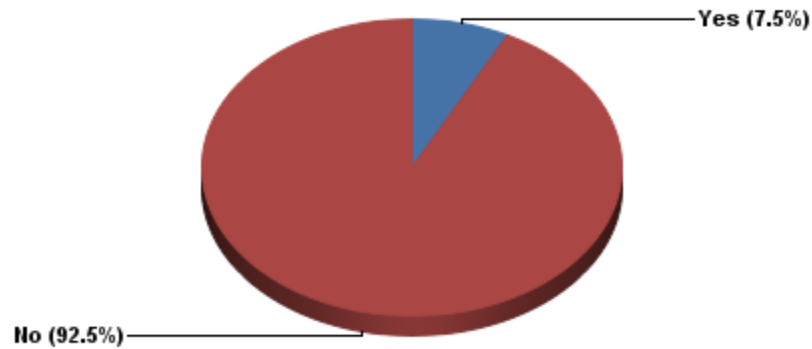


Figure 17. SLPs' Participation in Research through the NICU (n=133)

The results of question seventeen, displayed in Figure 17, reveal that 92.5% of the respondents had not participated in research in the NICU. Only a small percentage (7.5%) of the respondents had been involved in research within the NICU. The results of this question demonstrate an obvious need to further educate SLPs about the importance of research. Research can require significant time and resources; however, according to Wambaugh and Bain (2002), providing services without documenting their effectiveness may ultimately be more costly. Not all SLPs have the time or resources to participate in research, but they should all be made aware of its importance. Those who do choose to conduct research contribute not only to their own practices, but also to other SLPs nationwide.

Analysis

The findings of this study indicate a few conclusions. First, the SLPs were generally knowledgeable about the roles and responsibilities that were identified in ASHA's policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b). Each of the roles listed in the ASHA position statement was identified by more than 60% of the respondents as belonging to SLPs in the NICU. In other words, a majority of the SLPs were familiar with every role named in the ASHA position statement. In addition, out of the eleven roles included in questions seven through seventeen of the survey, seven (63.6%) were familiar to a majority of SLPs. These results led the researcher to reject the first hypothesis, which stated that the SLPs were not knowledgeable about the roles and responsibilities of the SLP in the NICU which were identified in the ASHA position statement.

Secondly, SLPs realize that their roles in the NICU are many and varied. Even though the SLPs were not familiar with some of the specific roles, a majority did identify each role as belonging to SLPs in the NICU. Although some SLPs were not personally familiar with the details involved in carrying out each role listed in the survey, a majority recognized the possibility for SLPs' involvement in every role. The SLPs were, as a whole, sufficiently knowledgeable about NICU practice to understand that SLPs can participate in a wide variety of roles and responsibilities within the NICU. Due to these results, the second hypothesis was also rejected. That hypothesis stated that a majority of the SLPs did believe that their single role in the NICU was in the treatment of feeding and swallowing disorders. A significant majority (94.2%) of the responding SLPs did identify feeding and swallowing evaluation and intervention as the *main* role of the SLP

in the NICU. However, far from identifying that area as the *single* role of SLPs, the respondents identified all sixteen roles listed in question one as belonging to SLPs within the NICU.

Finally, the majority of SLPs were not prepared for a career in the NICU upon completion of graduate school. Only 14.5% reported that their graduate programs included coursework on NICU practice, and only 6.5% reported feeling prepared for work in the NICU at the time of their graduation. These findings caused the rejection of the third hypothesis, which suggested that a majority of SLPs believed that they were prepared to work in the NICU following completion of their graduate programs. The results related to this hypothesis are the most troubling of all. SLPs are generally knowledgeable about their possible roles in the NICU and are even familiar with a majority of the specific roles included in the ASHA position statement. However, the results suggest that many graduate programs are not including coursework related to the NICU setting in their curriculums. An extremely small percentage of the responding SLPs attended graduate programs that prepared them for work in the NICU, and very few even provided any coursework on the topic. This gap between the knowledge graduate schools have provided and the knowledge needed in order to provide services in the NICU must be addressed in order to prepare SLPs to fill their ever-expanding roles in the NICU.

In conclusion, after analyzing the results of the survey, all three of the author's original research hypotheses were rejected. The first hypothesis stated that SLPs with a Masters degree and a Certificate of Clinical Competence were not knowledgeable about the roles and responsibilities of the SLP in the NICU that were identified in ASHA's

policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement*. However, the survey results revealed that a majority of the responding SLPs were, in fact, knowledgeable about all of the roles listed in the ASHA position statement.

This data also led to the rejection of the second hypothesis. The second hypothesis stated that SLPs with a Masters degree and a Certificate of Clinical Competence did believe that the single role of the SLP in the NICU was in the treatment of feeding and swallowing disorders. In question one of the survey, every role listed was identified by a majority of the responding SLPs as appropriate for SLPs' involvement in the NICU. The SLPs did not believe that their single role in the NICU was in the treatment of feeding and swallowing disorders; rather, they identified a variety of roles as belonging to SLPs in the NICU.

The third hypothesis stated that a majority percentage of the SLPs with a Masters degree and a Certificate of Clinical Competence believed that they were prepared to work in the NICU following completion of their graduate programs. Contrary to this hypothesis, a large majority of the responding SLPs did not believe that they were prepared to work in the NICU upon completion of graduate school. A slightly smaller majority even reported that their graduate programs did not include any courses on NICU practice. The implications of this research, including the rejection of the three original hypotheses, will be discussed in the next chapter.

CHAPTER V

DISCUSSION

Summary

Speech-language pathologists (SLPs) provide important services within the Neonatal Intensive Care Unit (NICU), helping to care for at-risk infants. The need for comprehensive services for preterm and low birth weight infants is greater now than ever before, due to these infants' increased survival rates (Robertson, Watt, & Dinu, 2009). SLPs can participate in a wide variety of roles and responsibilities in the NICU. These roles fall into four main categories, as described in the ASHA policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement* (2004b). The categories are as follows: (a) communication evaluation and intervention, (b) feeding and swallowing evaluation and intervention, (c) parent/caregiver education and counseling, staff (team) education and collaboration, and (d) other roles. The evidence supporting each of these roles is vast; however, the specialized knowledge needed to provide services in the NICU setting may hinder some SLPs' involvement in NICU practice (Boswell, 2007). In addition, graduate programs may not adequately cover the many and varied roles that SLPs can hold within the NICU. Education on this setting is vital in preparing SLPs to meet the ever-increasing demand for their services in the NICU.

This study was designed to investigate SLPs' knowledge of their possible roles and responsibilities in the NICU, their beliefs about which NICU roles they should

participate in, and their preparation in graduate school for work in the NICU setting.

Specifically the research hypotheses were:

1. SLPs with a Masters degree and a Certificate of Clinical Competence were not knowledgeable about the roles and responsibilities of the SLP in the NICU that were identified in ASHA's policy document *Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit: Position Statement*.
2. SLPs with a Masters degree and a Certificate of Clinical Competence did believe that the single role of the SLP in the NICU was in the treatment of feeding and swallowing disorders.
3. A majority percentage of the SLPs with a Masters degree and a Certificate of Clinical Competence believed that they were prepared to work in the NICU following completion of their graduate programs.

The participants for this study were ASHA-certified, masters-level speech-language pathologists who had been working in a medical setting for at least one year. The participants were gathered from across the United States and were identified both by searching the American Speech-Language-Hearing Association (ASHA) member directory and by contacting hospitals directly. The link to an electronic survey was emailed to the SLPs asking them to report on their familiarity with and participation in various roles identified in the ASHA position statement (2004b). The survey also asked the SLPs for their opinions on which roles should be included in SLPs' job description in the NICU. Finally, the survey asked the SLPs if any NICU practice courses were included in their graduate schools' curriculums and investigated their overall feelings

about their preparedness for work in the NICU upon completion of graduate school. Five hundred eighteen (518) surveys were sent by email and 140 responses were received.

General Discussion

After compiling the survey results, the researcher found that a majority of the speech-language pathologists were familiar with SLPs' roles and responsibilities within the Neonatal Intensive Care Unit which are listed in the ASHA position statement (2004b). All of the NICU roles listed in question one were identified by more than 60% of the SLPs as appropriate for inclusion in their scope of practice. In addition, 7 of the 11 specific roles named in questions seven through seventeen were familiar to the responding SLPs. These results refuted the first original hypothesis, which predicted that the SLPs would not be knowledgeable about their roles and responsibilities in the NICU as described in the ASHA position statement (2004b).

These findings also led to the rejection of the second original hypothesis, which predicted that the SLPs would believe that their single role in the NICU was in the treatment of feeding and swallowing disorders. The fact that a majority of the responding SLPs identified every listed role as appropriate for SLPs' involvement in the NICU demonstrates that the SLPs were aware that they have many possible roles within the NICU.

As discussed in Chapter IV, even those who were not familiar with some of the specific roles were aware that participating in those roles is appropriate for SLPs. This indicates that a majority of SLPs do have at least a basic knowledge about NICU practice and their possible roles within the NICU. One reason that the SLPs were more knowledgeable than expected about NICU roles might be their high percentage of

participation in continuing education related to this setting. On the survey, 64.5% of SLPs reported participating in seminars, conferences, or continuing education courses in order to gain further knowledge and skills related to speech-language pathology practice in the NICU. These results suggest that although SLPs' role in the NICU setting is still developing, many SLPs are interested in learning more about NICU practice.

Although the SLPs did not identify the treatment of feeding and swallowing disorders as their single role in the NICU, they were more familiar with this role than the others. The literature provided support for each of the roles of SLPs in the NICU. However, literature specifically supporting SLPs' involvement in these roles was less prevalent. The literature from speech-language pathology journals almost exclusively supported SLPs' involvement in feeding and swallowing evaluations and interventions; the author found very few SLP-specific resources that discussed roles other than those related to feeding and swallowing. As illustrated in the survey results, SLPs' perception of their NICU roles matches this trend in the literature. Instrumental feeding and swallowing assessment was identified by 94% of the responding SLPs as one of their roles in the NICU, and clinical feeding and swallowing assessment and feeding and swallowing intervention were both identified by 99% of SLPs. In addition, 77.5% of the SLPs were familiar with feeding and swallowing evaluations and interventions, and 94.2% believed that conducting feeding and swallowing assessments and interventions is SLPs' main role in the NICU.

These results can be attributed to several possible factors. First, many SLPs are probably quite familiar with treating swallowing disorders because dysphagia (disordered swallowing) is a main area of practice in speech-language pathology. SLPs can treat

dysphagia clients in many settings and across all age ranges. Consequently, this role is quite familiar to many SLPs. In addition, since the treatment of feeding and swallowing disorders is a specialty of the speech-language pathology discipline, SLPs may lead the NICU team when addressing feeding issues. This occurrence could be another contributing factor to SLPs' belief that feeding and swallowing evaluation and intervention is their main role in the NICU. Finally, the lack of SLP-specific literature on areas of NICU practice other than feeding and swallowing, as mentioned above, likely contributes to the continued focus on that role. SLPs do play an extremely important part in treating infants with feeding and swallowing difficulties; however, other NICU roles should also be emphasized and should be carried out in conjunction with feeding therapies.

The responding SLPs most frequently failed to identify communication assessment, assisting with breastfeeding, and neurodevelopmental assessment as appropriate roles for SLPs working in the NICU. In the future, SLPs need to be made more aware of all of the roles that they can fill in the NICU, especially those roles that were frequently not identified by the respondents as appropriate for SLPs' practice in the NICU. Further education is most needed in the areas of communication and developmental assessment and breastfeeding assistance, based on the fact that a comparatively large percentage of respondents did not identify these roles as belonging to SLPs working in the NICU. If SLP-specific education is offered on all of the roles named in the ASHA position statement on NICU practice, SLPs can be better prepared to participate in all appropriate areas of assessment and intervention in the NICU.

The final conclusion that the author drew from the survey results was that the majority of SLPs were not prepared for a career in the NICU at the time of graduation from their masters programs. An overwhelming 85.5% of responding SLPs reported that their graduate programs did not include any NICU practice courses, and an even greater majority, 93.5%, did not feel prepared for a career in the NICU upon completion of their graduate programs. These statistics indicate a significant lack of NICU education in graduate programs across the country. This deficit is most likely due to the specialized nature of NICU practice, which requires instructors to have certain knowledge in order to adequately teach graduate students about the setting. In addition, the results of these two questions could be affected by the length of time that the participants had been practicing, which was not measured. Recent graduates are more likely to have received education on the NICU than those who have been out of school for a longer period of time. Whatever the cause, these results show that graduate programs need to work toward including education on NICU practice in their curriculum in order to prepare their students for work in that setting.

Strengths and Limitations of Current Research

The current study has several strengths, primarily in participant selection. By selecting participants with experience in medical settings, the researcher was able to limit the respondents to those who should be familiar with at least some aspects of the NICU setting. However, by including participants from all medical settings, not exclusively from the NICU, general information was gathered about the speech-language pathology field as a whole. In addition, the survey was sent to SLPs from across the United States in an attempt to eliminate geographic bias. Due to the anonymity of the survey, the

researcher was unable to determine where the respondents were located; however, because the surveys were sent to a geographically diverse population, the responding SLPs are believed to be from a variety of locations. This broad survey distribution allowed for a wide range of SLP graduate school and work experiences. Some of the respondents may have attended graduate programs that included NICU education, while others may not have received any graduate education on the NICU. Likewise, some of the SLPs may work in the NICU, while others may work in hospitals with NICUs but do not personally service that unit, and some may have never even been inside a NICU. This broad range of educational and work experiences allowed for a more inclusive sampling of SLPs in the United States.

This study was a pilot study and was limited in several ways, beginning with the small number of survey responses. Although more than 500 surveys were emailed to SLPs, only 140 were completed. This sample size is small considering that this study was intended to be used to draw conclusions about SLPs working in all types of medical settings and from all parts of the country. An additional limitation was that because of the way the survey was designed, data could not be analyzed between questions. For example, the author could not determine whether the SLPs who reported that their graduate programs did include NICU practice courses were the same ones who reported familiarity with all or almost all of SLPs' possible roles in the NICU. Finally, the broad qualifications for participation required only one year of experience in a medical setting and did not account for varying lengths of experience beyond one year or investigate how experience might affect the SLPs' familiarity with the various roles.

Although this study could have been more specific in some areas, it did answer the original research questions posed. In addition, it provided useful information which can be used in planning further research on speech-language pathologists' roles in the NICU, their familiarity with those roles, and their preparedness for a NICU career upon completing graduate school.

Suggestions for Future Research

In the future, this study should be expanded or altered to gain more information about the topic. First, the study should be expanded to include more participants. Surveying a larger sample of SLPs would provide a more comprehensive look at SLPs' opinions on their roles in the NICU and their familiarity with these roles. Further efforts should also be made to survey SLPs from all fifty states and from a variety of medical settings, in order to gauge the overall general knowledge of SLPs from across the country, with and without direct NICU experience.

Another way to expand the study would be to allow more specific answers to the questions regarding the SLPs' familiarity with certain NICU roles. The current study allowed only "yes" or "no" answers and did not require the participants to further explain their answers. Providing more than two answer choices, or even allowing narrative answers, would more thoroughly investigate SLPs' familiarity with each role.

An expanded study could also seek to confirm the correlation between graduate school education on the NICU setting and future knowledge of NICU roles. Research of this type could help to determine if more graduate education on the NICU is actually necessary, or if the percentage of SLPs who choose to participate in continuing education on the topic is great enough that their original knowledge from graduate school is

inconsequential. In the current study, the author assumed that the extremely low percentage of SLPs who felt prepared for a career in the NICU upon graduation is a problem that needs to be corrected. However, future studies investigating the relationship between graduate school education and future success in NICU careers could help to confirm or deny this assumption.

This study could also be altered to include only SLPs who have NICU experience. These SLPs could provide information not only on their familiarity with the roles named in the ASHA position statement, but also on the roles in which they regularly participate. Additionally, the current study showed a lack of graduate school education on the NICU setting, and SLPs with NICU experience would be qualified to comment on which types of education would have been most useful to them in their current NICU careers. The current study can be used to make the basic suggestion that graduate programs incorporate some type of introduction to NICU practice in their coursework. Likewise, a future study of SLPs with experience working in the NICU would provide valuable information that graduate programs could use to further shape their NICU curriculum.

Conclusion

This thesis project was designed to investigate the roles of speech-language pathologists in the Neonatal Intensive Care Unit, specifically SLPs' familiarity with and opinions about those roles. The American Speech-Language-Hearing Association has created a set of policy documents identifying and explaining a list of possible roles for SLPs working in the NICU. An electronic survey was formulated using these roles and was emailed to 518 SLPs. The survey asked the SLPs to report on their familiarity with some of the specific roles, their opinions about which roles are appropriate for SLPs'

participation, and their preparedness for work in the NICU setting upon completion of graduate school.

After compiling the survey results, the researcher found that the responding SLPs were familiar with a majority of the roles from the ASHA position statement. The SLPs were most familiar with feeding and swallowing evaluation and intervention, as well as parent education and counseling, and they were least familiar with neurodevelopmental assessment and assisting with breastfeeding. The SLPs also believed that all of the listed roles were appropriate for SLPs' involvement. Finally, a majority of the SLPs were not prepared for a career in the NICU when they graduated from their masters programs.

Strengths of this study included the broad participation criteria and the attempt to eliminate geographic bias. These factors helped the researcher obtain information about the knowledge and opinions of medically-based SLPs from across the United States. Weaknesses were the small number of participants and the limited data analysis. In the future, this study could be expanded to include a greater number of participants and to allow for more detailed answers. The study could also be altered to include only participants with NICU experience, in order to gain more specific information about the roles of SLPs in the NICU.

This research has functional applications regarding both SLP education and actual NICU practice. The main educational implication of this study is the need for more education at the graduate level on NICU practice. Graduate programs should implement NICU practice courses in order to improve their students' familiarity with the roles of SLPs in the NICU and to prepare them for a NICU career following graduation. This study also revealed the need for continuing education opportunities on all aspects of

NICU practice in order to keep SLPs up to date on new information affecting their practice in the NICU.

Within the NICU, SLPs can use this research to support their participation in a variety of areas. This study found that although most SLPs knew that they could participate in many different roles in the NICU, significantly fewer had actually participated in all of these roles. SLPs should be aware that their involvement in caring for infants in the NICU can go far beyond feeding assessment and intervention. Hospitals should also be open to SLPs becoming more involved in roles that may traditionally have belonged to other professionals. Studies support the collaborative approach to NICU care, and SLPs should be willing to support an atmosphere of collaboration, even if it means becoming involved in roles in which they have not previously participated. Speech-language pathology practice in the NICU setting is unique in that it allows SLPs to interact with infants in the earliest stages of life. Research on this topic is valuable because it can help to clarify SLPs' important roles in caring for this special population, educate SLPs about the many roles in which they can participate, and support SLPs in their attempts to contribute to an increasing number of important roles within the NICU.

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APPENDICES

APPENDIX A

LETTER TO PARTICIPANTS

Dear Speech-Language Pathologist,

My name is Katy Greenlee and I am a senior at the University of Mississippi studying Communication Sciences and Disorders. I am currently conducting a research project to fulfill the graduation requirements for the Sally McDonnell-Barksdale Honors College. I have chosen to research the roles and responsibilities of speech-language pathologists within the Neonatal Intensive Care Unit (NICU). SLPs have an ever-expanding role in the NICU, helping to care for at-risk infants. As part of the NICU team, SLPs provide extremely important services to these infants. This project will investigate SLPs' familiarity with a variety of aspects of NICU practice, as well as their preparation for providing services in the NICU.

Included in this email is a link to a survey that I would appreciate if you could take the time to complete. The survey is internet-based and will take no more than ten minutes of your time. Your answers will be kept confidential. You are eligible to participate in this survey if you are a CCC-SLP with at least one year of experience in a medical setting after completing your CFY. **Your response to this survey is valuable even if you have no NICU experience.** If you would like a copy of the results, please enter your email address in the blank provided at the end of the survey.

By completing the survey, you are agreeing to have your responses collected as data and used in this study. However, none of your personal, identifiable information will be released. In addition, the data collected in this study will be destroyed one year following completion of the study.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482.

Research on SLPs' knowledge about their roles in the NICU is important for determining how SLPs can be better prepared for serving this specialized population. Thank you once again for taking the time to complete this survey. If you know of other SLPs who are eligible to participate in this survey, please forward this message on to them.

Sincerely,

Dr. Carolyn Higdon, CCC-SLP, Professor
American Speech-Language-Hearing Association Fellow
Department of Communication Sciences and Disorders
University of Mississippi
University, MS 38677
ASHA Vice President for Finance (2012-2014)
Email: chigdon@olemiss.edu

Katy Greenlee
Undergraduate Honors Student
University of Mississippi
klgreenl@go.olemiss.edu
(662) 230-0443

APPENDIX B

IRB APPROVAL LETTER



THE UNIVERSITY OF
MISSISSIPPI

Office of Research and Sponsored Programs
100 Barr Hall
P.O. Box 907
University, MS 38677
Office (662) 915-7482

May 29, 2012

Ms. Katy Greenlee
218 Oxford Way
Oxford, MS 38655

Dr. Carolyn Higdon
Communication Sciences and Disorders
University, MS 38677

Dear Ms. Greenlee and Dr. Higdon:

This is to inform you that your application to conduct research with human participants, ***Roles of Speech-Language Pathologists in the Neonatal Intensive Care Unit (Protocol 12-319)***, has been approved as Exempt under 45 CFR 46.101(b)(2).

Please remember that all of The University of Mississippi's human participant research activities, regardless of whether the research is subject to federal regulations, must be guided by the ethical principles in *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*.

It is especially important for you to keep these points in mind:

- You must protect the rights and welfare of human research participants.
- Any changes to your approved protocol must be reviewed and approved before initiating those changes.
- You must report promptly to the IRB any injuries or other unanticipated problems involving risks to participants or others.

If you have any questions, please feel free to call me at (662) 915-3929.

Sincerely,

Ashley E. Burch
Member, Institutional Review Board

APPENDIX C

SURVEY

1. Based on your professional knowledge, please identify ALL of the roles that you think should be included in the SLP's responsibilities in the NICU.
 - a. Communication assessment
 - b. Neurodevelopmental assessment
 - c. Clinical feeding and swallowing assessment
 - d. Instrumental feeding and swallowing assessment
 - e. Developmental intervention
 - f. Feeding and swallowing intervention
 - g. Parent education and counseling
 - h. Assisting with breastfeeding
 - i. Staff education
 - j. Interdisciplinary collaboration
 - k. Contributing to developmental care
 - l. Quality control/risk management
 - m. Discharge planning
 - n. Follow-up services
 - o. Supervision of students
 - p. Public education and advocacy
2. Did your graduate program's curriculum include any NICU practice courses?
 - a. Yes
 - b. No
3. Do you feel that you were prepared for a career in the NICU when you completed your graduate program?
 - a. Yes
 - b. No
4. Have you attended or participated in any seminars, conferences, or continuing education courses in order to gain further knowledge and skills related to speech-language pathology practice in the NICU?
 - a. Yes
 - b. No
5. In your opinion, what should be the SLP's main role in the NICU?
 - a. To conduct developmental assessments/interventions
 - b. To conduct feeding and swallowing assessments/interventions

6. What is your opinion about Licensed Occupational Therapists or other disciplines conducting feeding and swallowing evaluations/interventions?
 - a. I have no objection to licensed OTs performing feeding and swallowing evaluations/interventions.
 - b. I believe that only SLPs should conduct feeding and swallowing evaluations/interventions.
 - c. I have no opinion on this issue.
7. Are you familiar with neurodevelopmental assessments of infants?
 - a. Yes
 - b. No
8. Are you familiar with intervention techniques to facilitate social, interactive communication in infants?
 - a. Yes
 - b. No
9. Are you familiar with clinical and instrumental evaluations of feeding and swallowing and intervention techniques to facilitate safe feeding and swallowing in infants?
 - a. Yes
 - b. No
10. Do you have the knowledge to interpret infants' cues during feeding?
 - a. Yes
 - b. No
11. Are you familiar with ways to contribute to a family-centered care environment, including developmental care and parent education and counseling?
 - a. Yes
 - b. No
12. Are you involved in interdisciplinary collaboration with other health care professionals such as occupational therapists, physical therapists, lactation consultants, and nurses?
 - a. Yes
 - b. No
13. Are you knowledgeable about the quality control and risk management programs for the NICU in your facility?
 - a. Yes
 - b. No
14. Do you participate in discharge planning for babies in the NICU?
 - a. Yes
 - b. No

15. Have you ever supervised a graduate student or clinical fellow?
- a. Yes
 - b. No
16. Do you participate in public education and advocacy about services available in your area for the newborn population?
- a. Yes
 - b. No
17. Are you or have you participated in or directed any type of behavioral research through the NICU?
- a. Yes
 - b. No
18. If you would like a copy of the results, please enter your email address.
- _____